US Army Corps of Engineers
Kansas City District

Harry S. Truman Dam & Reservoir Missouri

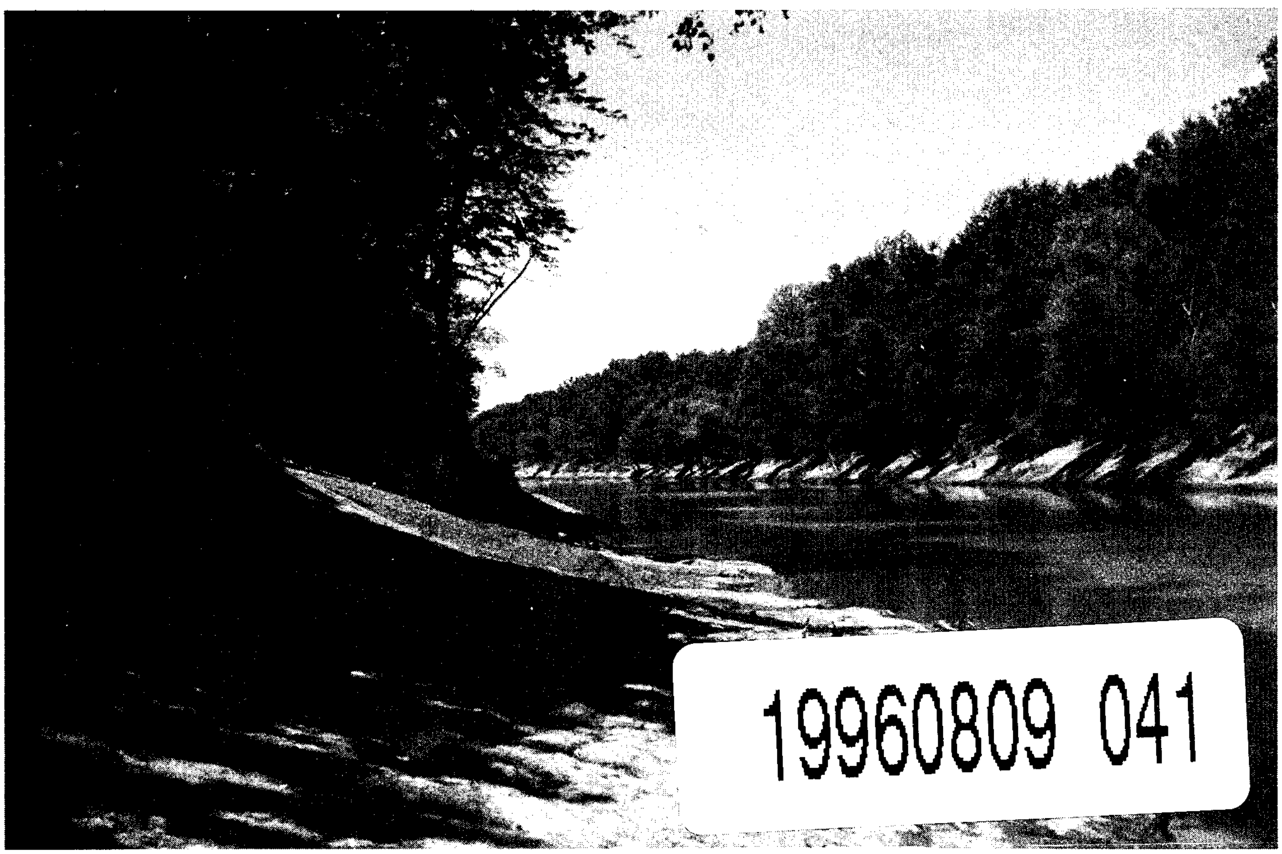
The American Archaeology Division
Department of Anthropology, University of Missouri
Columbia, Missouri

Prehistoric Cultural Continuity in the Missouri Ozarks: The Truman Reservoir Mitigation Project

Volume I — Project Background and Field Investigations

Contract No. DACW41-77-C-0132

DISTRIBUTION STATEMENT A
Approved for public release
Distribution Unlimited



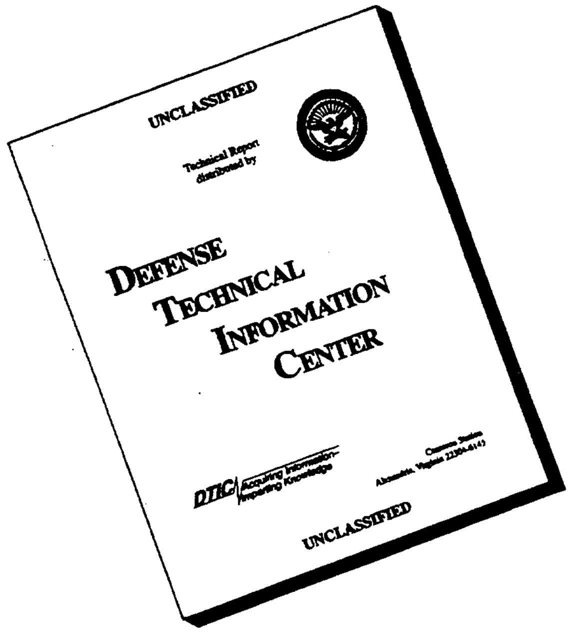
19960809 041

1993

DTIC QUALITY INSPECTED 1

By: Donna C. Roper
Principal Investigator

DISCLAIMER NOTICE



THIS DOCUMENT IS BEST QUALITY AVAILABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

PREHISTORIC CULTURAL CONTINUITY IN THE MISSOURI OZARKS:

THE TRUMAN RESERVOIR MITIGATION PROJECT

VOLUME I

PROJECT BACKGROUND AND FIELD INVESTIGATIONS

A project conducted for the
U. S. Army Corps of Engineers
Kansas City District
Under Contract DACW41-77-C-0132

by
The American Archaeology Division
Department of Anthropology
University of Missouri
Columbia, Missouri

Donna C. Roper, Principal Investigator

1993

The study performed herein by the Contractor for the Corps of Engineers was authorized by the National Historic Preservation Act of 1966, as amended, and the Archeological and Historic Preservation Act of 1974.

Funds for this investigation and report were provided by the U.S. Army Corps of Engineers. The Corps may not necessarily agree with the contents of this report in its entirety. The report reflects the professional views of the Contractor who is responsible for collection of the data, analysis, conclusions and recommendations.

The Kansas City District has delayed the publication of this report because 30 data figures and two data tables were not with the camera-ready originals to be used in the printing of this document. Various sources associated with the report were contacted to obtain copies of these figures, but the figures were unattainable. The District has been able to replicate some of these figures, however, 20 figures and the two tables were not reproducible. It was decided to print the report with the data missing. Most of the figures are missing from Volume I.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION
UNCLASSIFIED

1b. RESTRICTIVE MARKINGS

SECURITY CLASSIFICATION AUTHORITY

2b. DECLASSIFICATION / DOWNGRADING SCHEDULE

3. DISTRIBUTION / AVAILABILITY OF REPORT
APPROVED FOR PUBLIC RELEASE
UNLIMITED DISTRIBUTION

4. PERFORMING ORGANIZATION REPORT NUMBER(S)

5. MONITORING ORGANIZATION REPORT NUMBER(S)

6a. NAME OF PERFORMING ORGANIZATION
Department of Anthropology

6b. OFFICE SYMBOL *(If applicable)*

7a. NAME OF MONITORING ORGANIZATION

6c. ADDRESS *(City, State, and ZIP Code)*
University of Missouri
Columbia, Missouri

7b. ADDRESS *(City, State, and ZIP Code)*

8a. NAME OF FUNDING / SPONSORING ORGANIZATION
U.S. Army Engineering Dist, KC

8b. OFFICE SYMBOL *(If applicable)*
CEMRK-EP-PR

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
DACW41-77-C-0132

8c. ADDRESS *(City, State, and ZIP Code)*
700 Federal Bldg., 601 E. 12th Street
Kansas City, MO 64106-2896

10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.

11. TITLE *(Include Security Classification)*
Prehistoric Cultural Continuity in the Missouri Ozarks: The Truman Reservoir Mitigation Project Volume I - III, Tables Volume

12. PERSONAL AUTHOR(S)
Donna C. Roper, Principal Investigator

TYPE OF REPORT
Final

13b. TIME COVERED
FROM 1977 TO 1984

14. DATE OF REPORT *(Year, Month, Day)*
1993

15. PAGE COUNT
2,425

16. SUPPLEMENTARY NOTATION

17. COSATI CODES

FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS *(Continue on reverse if necessary and identify by block number)*
Pomme de Terre River Valley   Mortuary Practices
Prehistoric Settlement Patterns   Ozark Highlands
Harry S. Truman Dam and Reservoir Project

19. ABSTRACT *(Continue on reverse if necessary and identify by block number)*
The investigations focused on : 1) the nature of prehistoric settlement systems of the Pomme de Terre river valley; 2) the relationship of the Pomme de Terre river valley to the remainder of the lake area and to western Missouri in general; and 3) the study of how human communities used their natural environment, how they dispersed themselves and their activities across the landscape and located where they did, how prehistoric people extracted energy from the natural environment, and why these patterns change.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT
UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS

21. ABSTRACT SECURITY CLASSIFICATION
UNCLASSIFIED

NAME OF RESPONSIBLE INDIVIDUAL
Engineering and Planning Division

22b. TELEPHONE *(Include Area Code)*
(816)426-3402

22c. OFFICE SYMBOL
CEMRK-EP-PR

DD Form 1473, JUN 86   *Previous editions are obsolete.*

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

Encl 1 2

VOLUME I

PROJECT BACKGROUND AND FIELD INVESTIGATIONS

TABLE OF CONTENTS

VOLUME I: Continued

TABLE OF CONTENTS

VOLUME I: Continued

TABLE OF CONTENTS

VOLUME I: Continued

TABLE OF CONTENTS

VOLUME I: Continued

TABLE OF CONTENTS

Page

VOLUME I: Continued

TABLE OF CONTENTS

Page

VOLUME I: Continued

TABLE OF CONTENTS

VOLUME I

PROJECT BACKGROUND AND FIELD INVESTIGATIONS

LIST OF FIGURES

VOLUME I

LIST OF FIGURES: Continued

LIST OF FIGURES: Continued

VOLUME I

LIST OF FIGURES: Continued

VOLUME I

LIST OF FIGURES: Continued

LIST OF FIGURES: Continued

VOLUME I

PROJECT BACKGROUND AND FIELD INVESTIGATIONS

LIST OF TABLES

LIST OF TABLES: Continued

VOLUME I

LIST OF APPENDICES

PREFACE

Beneath a steep rock bluff, known locally as Kaysinger Bluff, near the town of Warsaw, Missouri stretches a mile-long, earth-fill dam. Planned in the 1940's and constructed in the 1960's and 1970's, the dam now impounds 55,600 surface acres of water forming the Harry S. Truman Reservoir. Although the Euro-Americans who resided on the lands acquired for the reservoir had a history of occupation of the land for over a century, we now know that even the earliest European immigrants to the Osage basin were comparative newcomers. Human groups have occupied the Osage basin for at least 10,500 years. Where now fishermen, waterskiers, duck hunters, and scuba divers will all engage in their respective pastimes, prehistoric peoples once lived and died. A partial record of their activities is now to be found spread across the landscape. When Truman Reservoir filled, however, it inundated and perhaps forever destroyed a significant portion of that record.

Federal preservation legislation of the 1960's and 1970's has recognized the tremendous information loss that occurrs when reservoirs fill, highways are constructed, or other types of land alteration occur and now mandate that projects done under Federal funding or licensing inventory, evaluate and, if necessary, mitigate the impact of such a project on the cultural resources. In the case of the Truman Reservoir, the Kansas City District of the U.S. Army Corps of Engineers has investigated the cultural resources of the Truman Reservoir portion of the Osage River basin through a series of contracts with a variety of institutions. The present report is on one of these contracts, viz., Contract DACW41-77-C-0132 "Mitigation of the Adverse Impact of the Harry S. Truman Dam and Reservoir Upon the Local Archeological Resources," along with Modification P00001 "Mitigation of the Adverse Effects of Harry S. Truman Dam and Reservoir Project, Missouri, on Archeological Resources, Survey and Excavation Within the Multipurpose Pool and Public Use Areas," and Modification P00002 "Absolute Dating of Samples Collected during Mitigation."

The investigations performed under this contract and its modifications involved testing and excavation at over 200 prehistoric sites, the initial recording of over 600 other sites, and the laboratory analysis and reporting of all this work. It consumed three years and occupied up to forty persons at a time. The preparation of a report of these investigations has not been an easy task. The volume of material to be reported in such an instance requires multiple authors, but the use of multiple authors introduces the problems of inter-dependence of authors on each other's results and of obtaining comparable results. It also means that the number of permutations

of separate sections is large, usually requiring an explanation of the organization finally chosen.

Maintenance of comparability of results was accomplished by a topical division of the reporting task. Analyses of material classes such as ceramics and lithics, regardless of their provenience, were accomplished by or under the supervision of a single person. Site reports were produced by other individuals, usually the person who supervised the excavations or at least someone who had served on the crew that investigated a given site. These reports then drew on the material class analyses produced by the specialists. Given this rationale for analysis the report itself is organized as follows. Volume I is considered as the basic report of the investigations. It presents the background to the project, the descriptive results of all survey and excavation conducted between June 1977 and August 1979, and a synthesis of the work conducted between June 1975 and the completion of the analysis and reporting in 1981. Volume II has been subtitled "Artifact Descriptions and Analyses." It presents descriptions of projectile points, ceramics, hematite, and other material classes recovered as well as several lithics studies conducted during the course of the project. The site reports in Volume I all draw on the descriptive frameworks presented in this volume. Volume III presents specialized studies of mortuary practices, skeletal remains, Osage ethnohistory, geomorphology, and soils. Each of these studies is essentially a monographic treatment of its subject matter. Each study can stand along, but all provide valuable background material for interpreting the archeology of the Truman Reservoir area. Volume IV contains the bulky tables for Volume I.

Proper rendition of a list of acknowledgements for a project of this magnitude and duration is a monumental undertaking in itself. Such a project is not done by one or even a few people; the cast in this instance is more nearly worthy of a Cecil B. DeMille production. While fearing that someone will be forgotten, I nevertheless wich to thank various individuals and groups of people:

A succession of cultural resource and environmental coordinators with the Kansas City District of the Corps of Engineers; various officials of the University of Missouri-Columbia, including but not necessarily limited to: Anthony Lampe, Bobby Jenkins, James Newberry, David McGuire, personnel of the Personnel Office, the Dean's Office, the Payroll Department, and the Accounting Department; successive Directors of the American Archaeology Division: William H. Marquardt, Carl H. Chapman, Charles W. Markman, Michael J. O'Brien; and successive curators of the same division: Alice N. Benfer, Robert Reeder; successive Chairmen of the Department of Anthropology: James A. Gavan, H. Clyde Wilson; various

administrative assistants both to the project itself and to the American Archaeology Division in general: Margaret K. Wood, Dele Doke, Carol Thoreson, Peggy J. Loy, and Mary Porter of the Department of Anthropology; personnel of various service departments at the University, including the Campus Computing Center and Technical Education Services; Corps of Engineers personnel in Warsaw, Missouri and other stations throughout the reservoir, including dam headquarters personnel and Corps rangers, all of whome helped coordinate construction and archeology to everyone's mutual advantage; the residents of the project area, particularly the people of Wheatland and Osceola, whose friendship, advice, and services were vital to completion of these investigations; the core of individuals who saw the mechanics of this report through to completion - most particularly Jean Sparks who is not only a incomparable typist, but cheerfully performed other chores that are undoubtedly not in her job description.

Various members of the faculty of the Department of Anthropology of the University of Missouri also provided indirect assistance to the project. Many project staff members were graduate or undergraduate students at the University. Various aspects of the analysis were undertaken in conjunction with their studies. Several papers that appear in this report were also submitted as theses for an M.A. degree; one study was presented as an undergraduate honors thesis. In such formats these manuscripts were subjected to the critical scrutiny of the Department's faculty and have benefited from their comments and advice. If I were to single out any individual for particular thanks it would be Dr. Robert A. Benfer whose statistical advice benefited many project participants.

I must, however, further single out two other Missouri faculty members for particular mention. Neither was technically involved with the investigations reported here, but both provided inspiration for not only myself but for all of the project staff members. I refer to Drs. W. Raymond Wood and Carl H. Chapman. The project reported here is the successor to the interdisciplinary investigations led by Dr. Wood in the Pomme de Terre valley in the 1960's. These investigations provided an intensively studied record that served as the baseline for comparisons and contrasts of the material recovered during the late 1970's. Although I have tried to place my own mark upon the mitigation project, I am grateful for the example he has provided. An even more basic contribution to Missouri archeology is that of Dr. Chapman whose lifetime of exploration of Missouri's antiquities has provided the fundamental baseline for all subsequent work in the state. Despite heavy committments, Dr. Chapman always maintained a great interest in the progress and results of the Truman investigations and has always been willing to discuss the work and the collections and has been most helpful in providing comparative material and references.

Finally, of course, is the project staff itself - the estimated 160 individuals who surveyed, excavated, processed, analyzed, and reported. Most archeology crews will work hard and play hard, and the Truman crews were no exception. Their hard work led to the project's success and every person employed by the project can consider themselves to have made a positive contribution. Their hard play allowed some of the less glamorous moments to seem of less consequence. My biggest thanks to them.

DCR

PART I.

PROJECT OVERVIEW

CHAPTER 1

THE PROBLEM ORIENTATION OF THE 1977-1980 TRUMAN RESERVOIR INVESTIGATIONS

by

Donna C. Roper

Introduction

The problem orientation and research design of the investigations performed under contract DACW41-77-C-0132 and reported herein are a direct outgrowth of the orientation of the previous Cultural Resources Survey. That survey took the cultural/environmental model formulated at Rodgers Shelter as the most comprehensive statement on the archeology of the reservoir but argued that it was not possible to understand Rodgers except as a series of sites, each of which comprised only part of the annual settlement cycle of the prehistoric inhabitants of the Ozark Highland (Roper and Wood 1975). Because we believed this and because we wished to continue the overall orientation of the interdisciplinary investigations that produced the Rodgers Shelter model, we defined three sets of questions, 2 substantive, 1 theoretical, on which the project was to focus: (1) the nature of settlement systems in the Pomme de Terre valley, (2) the relationship of the Pomme de Terre valley to the remainder of the reservoir and to western Missouri in general, and (3) the study of how human communities use their natural environment, how they disperse themselves and their activities across the landscape, why they locate where they do, how they extract energy from the natural environment, and why these patterns change (Roper and Wood 1975).

None of these topics is stated as a directly researchable question. However, under these headings Roper (1977: 4-6) listed a variety of substantive questions that are directly researchable. Additionally, numerous very specific culture-historical and settlement pattern questions were raised that were directly amenable to analysis (Roper 1977: 16-56). Not all of these were answerable with survey data alone, however, and some were beyond the current state of knowledge in Truman Reservoir. The conclusions and recommendations therefore suggested that "the chronology of the

prehistoric occupations of the Truman Reservoir is still poorly known" (Roper 1977: 232) and identified particular problem areas and questions that remained (ibid.: 232-235). These highlighted the Dalton and Woodland periods, problem areas subsequently specifically written into the Scope-of-Work for the present investigations, although the Archaic period was also discussed.

Beyond these culture-historical problems were topical concerns. It was therefore recommended (Roper 1977: 235-236) that the cultural-environmental theme remain a central concern in order to provide continuity with the previous decade and a half of research in the Ozark Highland, that settlement analysis be continued, and that cultural dynamics be investigated.

Accordingly, three research themes were established for the present investigations and were used to orient both field and laboratory operations. The first of these was the strengthening of the prehistoric chronology, very poorly documented, but absolutely essential to the achievement of other goals. The second was the study of settlement systems in the western Ozark Highland and adjacent Western Prairie. This was the continuation of the effort to establish the position of Rodgers Shelter in the Pomme de Terre Valley and the position of the Pomme de Terre Valley in the Osage Basin, western Missouri, and the eastern United States in general. The third theme was the demonstration and explanation of cultural continuity in the Ozarks. Models to explain this phenomenon have always been lacking, even though the theme of conservatism has run through the Ozark prehistory literature for over 30 years. The background, objectives, and implied operations for each of these themes is described in this chapter.

Chronology

PREVIOUS ARCHEOLOGICAL INVESTIGATIONS IN TRUMAN RESERVOIR

The problem of chronology derives from the history of investigations in the central Osage River Basin and is best understood as deriving from those investigations. Accordingly, prior to discussion of the current understanding of the prehistoric chronology and substantive problem areas, it will be useful to examine the history of archeological investigations in Truman Reservoir, not as a chronicle (this has already been done [Roper 1975b]), but from a vantage point of problem orientations.

Interest in and study of the antiquities of the area now identified as Truman Reservoir dates back well over a century. In spite of this long history of investigations,

the area is very poorly known. At least two reasons may be discerned. First, although investigations have a long history, they have not always been intense. Second, and probably most important, the nature of the archeological record is such that data pertinent to prominent questions in American archeology are hard to extract. That is, preservation is poor thus largely precluding detailed subsistence analysis. Pedoturbation of alluvial sediments has been extensive, making it infuriating to try to determine stratigraphy. Surface indicators of differentiation of site types are not understood, and site location patterns are not obvious, making settlement pattern analysis seem less than interesting. For these reasons, and others, many investigators have felt that the area has no potential.

Willey and Sabloff (1974: 21) have characterized the years 1492 - 1840 as a period in American archeology in which most archeological data were generated incidental to other pursuits. Rather little archeological activity is reported in the Truman area during this period. The earliest mention of Truman area antiquities is that by Albert Koch (1857), writing on his 1840 excavations in Hickory County (then part of Benton County). Koch's main interest was large vertebrate fauna, and he traveled far and wide to obtain specimens for his collections (Stadler 1972 and McMillan 1976b, both recount some of the travels of Koch). His travels took him to the Pomme de Terre River valley where he investigated a spring (now referred to as Koch Spring) and recorded the presence of projectile points in what he took to be association with mastodon remains. He subsequently published (Koch 1857) an exposition of the evidence for the contemporaneity of man and mastodon at this spring, as well as at a spring on the Gasconade River where points were similarly found with extinct megafauna; his claims of archeological finds at both these Missouri sites subsequently became the subject of a controversy that lasted for nearly 2 decades (see Montagu and Peterson (1944) or McMillan (1976b) for reviews). Contemporary reevaluation of Koch's claims suggests that he probably did indeed find projectile points with mastodon bones, but that he probably misunderstood the nature of their association (McMillan 1976b: 93). Recent investigations in the Pomme de Terre springs have failed to record additional artifacts associated with extinct fauna.

American archeology in the late 19th and early 20th century was marked by intensive explorations for mounds and other antiquities throughout the eastern United States (Willey and Sabloff 1974: 42). The majority of Missouri antiquities described in these endeavors were from the Mississippi Valley, and although the Ozarks were explored, expeditions either did not reach the Truman area or found

nothing worthy of note. Thomas' (1891) catalog of prehistoric remains east of the Rocky Mountains lists no remains in the Truman area proper, although it does list several mounds in nearby Dade and Johnson counties. Bushnell's (1904) brief paper "Archaeology of the Ozark Region of Missouri" also does not specifically mention any sites in the Truman area, but it does make general statements about the archeology of the Osage River, and describes a series of mounds on the nearby Niangua River. Similarly, Fowke (1910, 1922) describes antiquities near, but not in, the Truman area itself. Much of this work was devoted to the collection, cataloging, and description of antiquities, with little to no classification or synthesis of the material. Interest was largely on either large earthworks or well-made elaborately decorated ceramics. Neither of these occur in any quantity in the Ozarks. Thus, in relation to the goals of this era, the Truman area held little research potential.

If the archeology of the Truman area and the Ozarks in general was not particularly prominent at a national level, however, it is apparent that state and local level interest was present. For example, Jesse Wrench and M. G. Mehl of the University of Missouri took a float trip on the Sac River in 1931. Their purpose was to look for shelters and caves, and their expedition did generate local newspaper coverage (Synhorst 1977: 285). The Missouri Archaeological Society was founded in 1935, providing the opportunity for expression of local interests throughout the state. There was obviously interest in archeology by residents of the Truman area, for the first membership list of "The State Archaeological Society" lists 5 members from Osceola and one each from Clinton and Weaubleau (The Missouri Archaeologist, Vol. 1, No. 1, 1935). Given this interest, however, it is curious that indexes to The Missouri Archaeologist (Spier 1950, Welch 1972: 1-23) record no articles before 1954 on the archeology of the central Osage River basin.

In 1946, the Society expanded its publications to include a Newsletter. Reports on the archeology of the Osage valley were sparse but did appear, usually in the form of brief notes on finds of particularly fine or unusual artifacts or on prominent sites (see Welch 1972: 25-59 for an index of the Newsletter from its beginning to December 1971). They do comprise the first regular notice, subsequent to Koch, of the archeology of the area now inundated by Truman Reservoir. Because of their particularistic nature, however, they were of little help in synthesizing the prehistory of the area.

It was during this same period of the late 1930's and early 1940's that Midwestern archeologists had turned their attention to systematizing their knowledge of prehistory.

By the mid-1930's, sufficient evidence had accumulated from all over the Midwest that construction of a series of classes of material was possible. The result of the taxonomic labors of the 1930's was the Midwest Taxonomic System (McKern 1939), conceived as a taxonomic hierarchy of units showing successively more generalized similarities: component, focus, aspect, phase, and pattern (originally basic culture). All units were based entirely on content. Thus, for example, the Woodland Pattern included ceramics that were grit-tempered, often cord-marked, and of an elongate globular shape; also comparatively large, stemmed or notched points; primary and secondary flexed burials, in mounds, with comparatively sparse grave goods, etc. (Deuel 1935, McKern 1939, Anonymous 1943).

The Midwest Taxonomic System (or MTS) was applied to the Ozark antiquities soon after its formulation. An anonymous article in the third issue of The Missouri Archaeologist (1935) summarizes the Woodland and Mississippi Basic Cultures as described by Deuel (1935) and proclaims that this article "sheds considerable light upon the problems of archaeology in Missouri" (Anonymous 1935: 5). In 1938, Fenenga used the MTS to organize ceramics from Pulaski County (Fenenga 1938) and from this time on, MTS taxa were frequently used to help organize Missouri material (Berry, et al. 1938; Adams and Magre 1939; Berry, Wrench, and Chapman 1940; Adams, et al. 1941; Griffin 1941; Hoebel 1946). Units finer than pattern were rarely used, however, and new units derived from the Ozarks data and applicable to the Ozarks were not created.

This latter situation changed somewhat in 1946 when Carl Chapman's M.A. thesis (published 1947-1948) presented a synthesis of the prehistory of the entire state of Missouri, choosing the MTS for classifying cultures "because of its widespread use throughout the greater part of the Mississippi Valley" (Chapman 1946: 6). With this work, Missouri archeology, including that of the Ozarks, was committed to an MTS organization of its antiquities. Curiously, the antiquities of Arkansas and northeast Oklahoma, even the part in the Ozarks and immediately adjacent to Missouri, were not always similarly organized. Because of historical accident, and inclusion within the boundaries of the State of Missouri, the archeology of the area now known as Truman Reservoir has always been organized with an MTS or MTS-derived taxonomy. At first, the sequence as given for the Truman area was relatively simple (Chapman 1947: 154-155; see Fig. 1.1): artifacts associated with early extinct mammal remains had been reported (by Koch), the Archaic was entirely unknown, and manifestations of the Hopewellian Phase and the Highland Aspect of the Woodland Pattern were recognized, although evidence for Hopewell was very sparse (Chapman 1947: 86; that evidence, in fact, largely seems to be derived from "a few sites" recorded during a 1941 reconnaissance in Vernon, Bates, St. Clair, and Barton counties [Mack 1942: 19]).

Figure 1.1. The development of cultural taxonomy in the central Osage River basin.

FIGURE NOT AVAILABLE

Even as Midwestern archeologists in general were affirming that the MTS was entirely content-based, they were in fact also attempting to place their taxa in at least relative chronological sequence using evidence from both stratigraphy and seriation. Cole and Deuel's (1937: 199-206) ordering of the material from Fulton County, Illinois is one of the first examples at a local level, while a paper by Cole (1943) attempted to work out chronological sequences for a large part of the Midwest by drawing upon available stratigraphic evidence. These chronologies were simply lists of taxa in inferred chronological order.

It was perhaps a short step, however, to recognizing general periods in eastern U. S. prehistory. In 1946 Griffin (1946: 39) noted that "successive cultural stages throughout the eastern United States can be erected on the basis of local stratigraphy, the interchange of specific cultural items and the common possession of definite cultural concepts at specific chronological periods." He thus recognized a series of periods which he generalized to the entire eastern United States. These periods were designated by higher-level MTS taxa, including the pattern taxa Woodland and Mississippian; he deliberately did not apply the term Archaic to designate the preceramic assemblages (Griffin 1946: 42) but the term has come into general use anyway. Completely content-based units were thus given double duty by turning them into temporal units as well, a practice that has subsequently caused much trouble for archeologists (see also Stoltman 1978: 708-711). Chapman (1947-48) similarly used higher-level MTS taxa to designate major periods of Missouri prehistory. In the formulation of a general state-wide taxonomic scheme, therefore, these were applied to the Ozarks as well as to any other place in Missouri and were often applied by extrapolation from better-known areas, or on sparse evidence.

Knowledge of the culture sequence in the central Osage basin did in fact not change much until 1961 when Wood (1961) published the results of the analysis of two seasons' work in the Pomme de Terre Reservoir. In this he used Rouse's (1955) approach to forming units, with results as shown in Fig.1.1. Note that the Archaic ("Preceramic Period") is still very poorly known, and that even though rather more detail is given for the "Ceramic Period" occupations, the chronology is still relative with no dates more specific than a 3000 year period.

At this time, the data base for the Truman Reservoir was extremely poor. The flooding of Lake of the Ozarks with no archeological investigations whatsoever had alerted interested persons in the state of Missouri to what was being lost when such land alterations occurred and reservoir salvage in Missouri began actively in 1938 (Chapman 1954: 10). With

only limited funds available, priority went to the most immediately needed projects. In spite of this, a brief note in the Missouri Archaeological Society Newsletter for April 20, 1950 announces the commencement of archeological survey in Kaysinger Bluff Reservoir on April 6, 1950. This and subsequent surveys, while adding to the previous scanty inventory of recorded sites in the reservoir, were intermittent, performed as funds were available and time permitted. Again, other more immediate priorities required more intensive survey. Prior to surveys funded by the National Park Service, therefore, less than 40 sites in Truman proper had been reported to the Archaeological Survey of Missouri, and only two of these, Vista Shelter (23SR20) and Blackwell Cave (23HI172) had been excavated and subsequently reported (Wood 1961, 1968).

The first contracts for archeological survey in Kaysinger Bluff Reservoir were entered into between the University of Missouri and the National Park Service in 1959, and from then through 1962 surveys were conducted regularly. Keller (1964: 219) has stated the survey goals of the time:

> The survey and testing was aimed in great part at the location and evaluation of mounds, cairns, caves, and rock shelters due to the fact that these sites with their concentrations of refuse were often vandalized. . . . Open campsites with heavy concentrations of refuse were also sought, and all sites of possible importance in evaluating and interpreting the archaeology of the proposed reservoir were located.

To the archeologist of the late 1970's, for whom all sites are of possible importance in evaluating and interpreting the archeology of an area, and for whom the goals of archeology are vastly broader than they were in 1959, this seems like a narrow-minded statement of rather limited goals. But in the late 1950's archeologists had only begun to state the concept of the settlement pattern and were largely concerned with large habitation and ceremonial sites, generally because their overall goal was culture-historical and it was from these sites that the best information would be gained. It was to be nearly another decade before the place of the small sites in a regional settlement system would be recognized. To a practice of archeology concerned largely with taxonomy and chronology, therefore, the goals stated by Keller were reasonable and consistent.

Keller's (1954) report on the 1959-1960 survey and testing covered 86 sites in St. Clair (31 sites), Hickory (1), Cedar (1), Vernon (2), Benton (16), and Henry (35) counties. Fifty-seven of these are open sites, nineteen are caves or

shelters, and 10 are mound or cairn sites, each containing from 1 to 8 mounds or cairns. Fifteen of these 86 sites were subsequently at least partially excavated and reported (see Roper 1975: 2 for listing). The 1961-1962 surveys were, unfortunately, never fully reported, although McMillan (1965) described the artifacts from 54 new sites. Nine of these sites (listed in Roper 1975b: 3) were subsequently excavated and reported. Additional sites were also recorded but not described. Fifteen of these were subsequently excavated and reported (Roper 1975b: 3-4).

Theoretically, the materials recovered at all these sites recorded and examined between 1959 and 1962 could have been used to construct an areally specific taxonomy and chronology; but in fact, the needed synthesis never occurred. Not that such a task would have been simple, for open sites often were found to contain shallow deposits and shelter sites to be thoroughly disturbed. An attempt by Wood (1961) to construct an areal chronology in the Pomme de Terre valley was initially useful (Wood 1961: 118) but has since seemed less satisfactory.

The major synthesis of the archeology of the central Osage River basin has ultimately come from a single site, recorded during the 1962 season. The original survey sheet for 23BE125, Rodgers Shelter, contains the innocuous notation: "Appears to be a rich site." This proved to be a masterful piece of understatement.

Prolonged discussion of the investigations at Rodgers Shelter need not be given here – this work has been fully described by Wood (1976: 6), McMillan (1976c), and Kay (1978b). Suffice it here to say: (1) that after the initial testing in 1963 "it was agreed that Rodgers Shelter has the potential depth for working out certain chronological problems that had plagued archaeologists at other shallow, multicomponent sites in western Missouri" (McMillan 1976c: 112), and (2) realization of this potential consumed the major archeological labors in Truman Reservoir from 1964 through 1968. The Rodgers investigations have been summarized and synthesized by McMillan (1971) and Wood and McMillan and their colleagues (Wood and McMillan 1976).

The period during which Rodgers was investigated falls near the beginning of a segment of the history of American archeology in which major changes in the overall orientation of the discipline occurred. With taxonomic principles refined and chronology beginning to be settled with the availability of radiocarbon dating, archeologists turned to the consideration of other questions. In particular, they began to regard the artifacts, features, and other objects encountered during investigations as material reflections of

cultural elements. That is, artifacts and their associations were assumed to be reflective of the structure of prehistoric societies and their interactions with their biophysical environments (see, e.g., Binford 1962).

Within this new archeological orientation came an interdisciplinary emphasis on archeological sites as reflective of the interaction of human communities with their natural environments. Work at Rodgers Shelter in the 1960's assumed this type of orientation. Investigations centered in a small portion of the Pomme de Terre Valley surrounding Rodgers Shelter, and included investigations of geochronology, pollen, fauna, flora, human osteology, and vertebrate paleontology (see Wood 1976: 7-9). The basic research strategy was "to outline the past environments of the Ozarks, and to understand how man adapted to, and perhaps modified, those environments" (Wood 1976: 9). The progress of this work through the early 1970's has been summarized by the various specialists working in the area (Wood and McMillan 1976; Saunders 1977).

During and shortly after the years that Rodgers was being excavated, other work was being funded by National Park Service contracts. In 1966, Falk reexamined Blackwell Cave, excavated the open Merideath Site (23SR129), and briefly tested several other open sites and cairns (Falk 1969). In 1967 and 1968, Falk and Lippincott excavated at the Thurman site (23HE151), conducted limited surveys in the vicinity of Thurman, and tested several other sites (Falk and Lippincott 1974). Also during 1968, Pangborn surveyed and recorded additional sites in Benton, Hickory, and St. Clair counties. Fourteen new sites were recorded including two shelters, four mounds, four open sites, and four spring bogs. Most of these sites have subsequently been excavated and reported.

In 1969, Lippincott carried out a small amount of survey, excavated the Fulton Site (23BE152), one of the sites recorded by Pangborn in 1968, and tested several other sites (Lippincott 1972). In 1970, Vehik excavated at Saba Shelter (23BE149) and the Miller Site (23BE151), both also open sites reported by Pangborn in 1968 (Vehik 1974, 1978).

Unfortunately, despite the fact that their investigations were undertaken simultaneously with the Rodgers investigations, they were never integrated with the interdisciplinary investigations in progress around the Rodgers excavations. They were, in fact, largely performed under the culture-historical paradigm that still held (and indeed still holds) a prominent position in American archeology (cf. Flannery 1967), and very explicitely regarded as salvage archeology projects. Each investigation is highly

particularistic, resulting in a report that is purely descriptive and contains a minimum of comparison and less synthesis. The end product of all the work of the 1960's was therefore: (1) a well worked out cultural/environmental synthesis for a single site – Rodgers Shelter – that provides much detail about the Archaic sequence but is compressed in the upper, Late Archaic and Woodland, stratum; (2) a series of site reports on excavations in largely Late Archaic and Woodland sites that are so lacking in comparison and synthesis as to largely do nothing to revise Wood's (1961) outline of the culture sequence in the Pomme de Terre Reservoir, nor to illuminate the confused portions of the Rodgers Shelter sequence; (3) the knowledge that part of the reason for a poor knowledge of the Archaic was its potential for being buried in Holocene alluvial deposits; and (4) the demonstration (implicitly, if not explicitly) that data relevant to major research orientations in American archeology could indeed be generated in the Truman Reservoir area.

In 1975, two contracts were awarded by the U. S. Army Corps of Engineers for archeological investigations in the Truman Reservoir. One of these, with the Illinois State Museum Society, was for massive excavations in the summer of 1976 at the soon-to-be-inundated Rodgers Shelter. Subsequent modifications to this contract allowed major excavations at Phillips Spring in 1977 and 1978 (Kay 1978a describes the results of these investigations).

The second contract was with the University of Missouri and was for a Cultural Resources Survey of the entire reservoir. Although a complete inventory of the reservoir's archeological resources was not possible, given time and funding limitations, it was possible to survey nearly 25% of the 166,000 acres purchased by the Corps. This included a 10% stratified random sample of the fee lands. A total of 1428 sites were recorded and reported to the Corps of Engineers (Roper 1977) – a total nearly five times as large as that resulting from the previous four decades of archeology in the reservoir.

Given the poor knowledge of culture history, it was apparent at the beginning of the Cultural Resources Survey in 1975 that many questions about culture sequence and chronology needed to be answered if the goal of modelling settlement systems was to be realized. It had been hoped that the Rodgers sequence, including new information from the continued work there, would help in organizing the survey collections (Roper and Wood 1975). As it happened, a number of conclusions were reached after the survey that had direct bearing on the strategy for continued investigations:

1. Chronological data cannot, of course, be gained from survey collections alone. While survey data are useful for other purposes, chronological placement of survey collections can only come from comparison with stratified sequences from dated sites. The chronological placement of survey materials is therefore no better than the sequences with which they are compared. In the Truman case, there were few dated sequences that were applicable to the bulk of the material, and no good published typologies available for comparison. It was obvious that it would be necessary to largely redo the typology.

2. The stylistic variation in the survey collections was by no means duplicated at Rodgers Shelter, while styles present at Rodgers Shelter were not found in the survey collections.

3. The Holocene terrace deposit that contained the Rodgers sequence is widely spread throughout the entire Osage basin and is not restricted to the Rodgers locality. The potential for burial of early sites (especially Dalton through Middle Archaic) is high and must be accounted for in site survey.

4. When even large collections are examined and compared with collections from outside the reservoir, the impression is strong of a local stylistic continuity. The reasons for this continuity beg explanation.

Given these conclusions, a number of field and laboratory activities become relevant:

1. Many open sites are shallow and contained within the plow zone. However, sites on lower terraces have the potential to have depth and, more importantly, to be stratified. Sites recorded during Stages 1 and 2 survey should therefore be evaluated to assess the depth of their deposits; new sites recorded should be immediately assessed in a similar manner.

2. Once such sites are located, test excavations should be carried out with an emphasis on, among other things, obtaining sufficient quantities of artifacts – especially projectile points and ceramics when available – to help establish the sequence. Materials suitable for dating by radiocarbon, thermoluminescence, and archaeomagnetism should also be collected when feasible.

3. The ceramics and projectile points in particular should be analyzed for culture-historical information. Specifically, identifications should be made to already defined, named classes, when possible, and efforts should

be made to make comparisons on a broad scale. Caution should be exercised, however, to not overlook specific regional idiosyncracies that may be important. Unidentifiable specimens should be grouped to form new, provisional classes which may then be examined stratigraphically and by association, when such data are available.

4. Absolute dating should be performed on at least some judiciously chosen samples. It is apparent that one of the basic reasons for such a poor body of absolute dates with which to compare the new material is that radiocarbon-datable organic materials are rarely, and then poorly, preserved. It is obvious that some other technique, preferably thermoluminescence should be substituted.

5. All these data should be synthesized to update the culture-historical sequence for the Ozark Highland - Western Prairie interface.

THE PREHISTORY OF THE CENTRAL OSAGE RIVER BASIN-1977: BASELINE KNOWLEDGE AND PROBLEM AREAS

As background to the mitigation contract investigations, the prehistory of the Osage River Basin, as understood in 1977, is outlined here. Following the precedent shown to have been established, a traditional eastern United States organizational framework is used. This divides the entire culture sequence into the Paleo-Indian, Archaic (subdivided into Early, Middle, and Late), Woodland (also subdivided into Early, Middle, and Late), and Mississippian periods. Unfortunately, strict adherence to these terms introduces a potential source of confusion, for they were later transformed into periods. Some archeologists have retained the old terms for their original content only and have adopted alternate terms for temporal designation (the essay by Stoltman [1978] is a particularly lucid example). However, the traditional terms are sufficiently ingrained in the literature and have recently been reaffirmed in Missouri (Chapman 1975, 1980). They will, therefore, be employed here in a time sense only. Their approximate temporal placement is shown in Fig. 1.2.

Paleo-Indian

The beginning of the Paleo-Indian period is variously dated, depending upon criteria for acceptance of dates and the earliest evidence in a given region. In Missouri, Chapman dates the Paleo-Indian period as 14,000 - 10,000 B.P., dates that have wide acceptance. This period is characterized by the presence of fluted lanceolate projectile points. It is also that period that witnessed the waning of the last (Wisconsinan) glaciers and the transition to a modern forest. Paleo-Indians are traditionally assumed to have

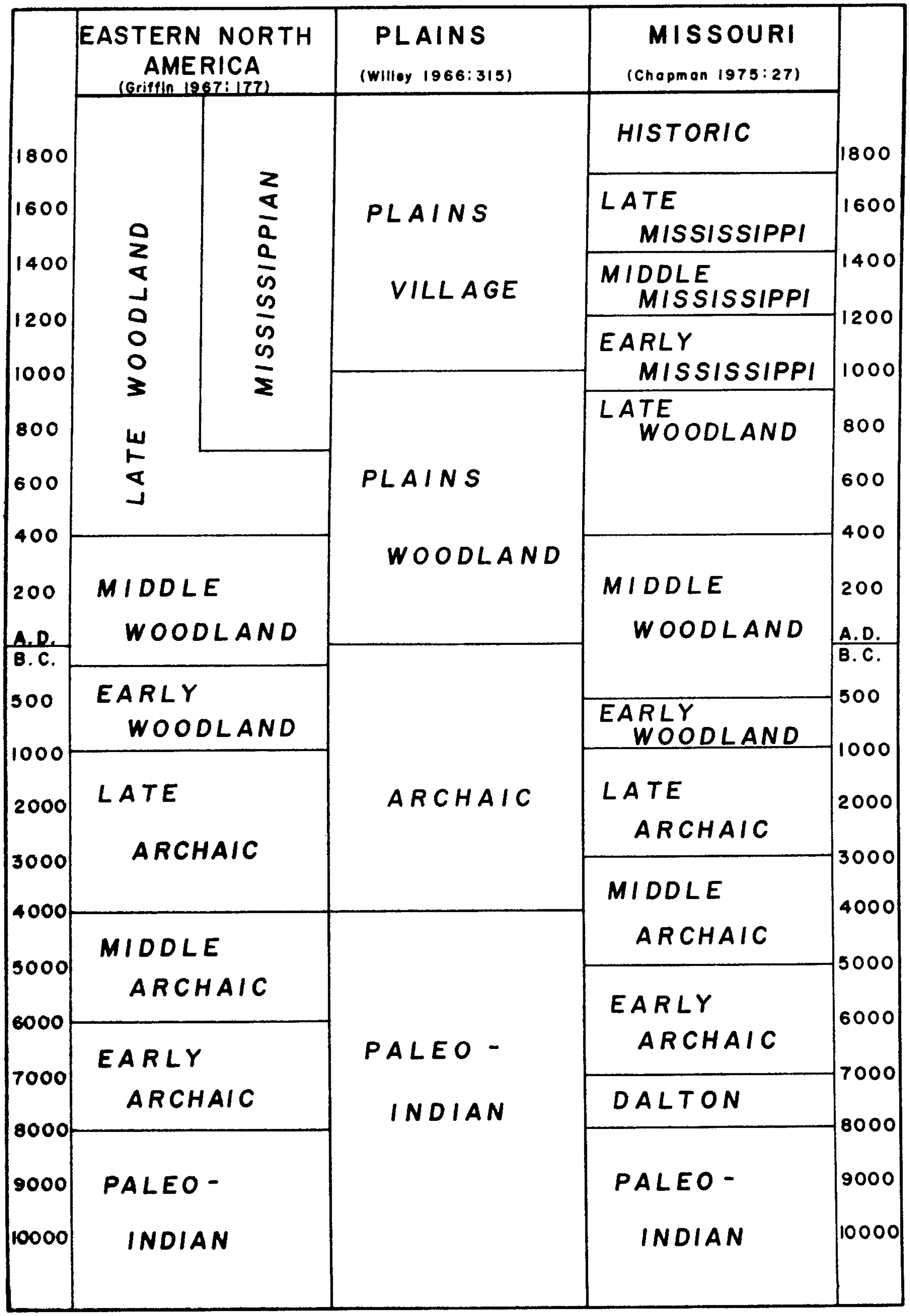


Figure 1.2. Comparative chronology of the Eastern United States, the Plains, and Missouri.

been hunters of large, now extinct, game, especially the American mastodon; however, evidence for such a subsistence base is limited to a single example (and that recorded only in 1979 [Graham 1979]). Fluted points (Clovis and variants of Clovis) are widely distributed in the eastern United States (Wormington 1957), however, they occur very infrequently not only in the Truman area, but in the wider Ozarks and prairie edge. A fluted point survey of Missouri showed only a single specimen recorded in each of Benton, Cedar (Smail 1951), and St. Clair counties and none in either Henry or Hickory counties (Chapman 1975: 67). Beyond this, however, there are few recorded in any county of the Ozarks, either in Missouri (Chapman 1975: 67) or Arkansas (Newton 1977), and even fewer in areas on the eastern fringe of the prairies. For example, only 16 fluted points were recorded in the entire state of Kansas as of a few years ago (O'Brien 1972, Iroquois Research Institute 1977: 127).

The reason for the scarcity of Paleo-Indian points in Truman Reservoir and the surrounding region has never been clear. The failure to record a single example in collections from the over 1400 sites recorded during the Cultural Resources Survey should lend some credence to the suspicion that their scarcity is not totally a result of sampling accident. This, of course, does not explain their absence. Since it is so, therefore, the major research question is surely the examination of possible reasons for the scarcity of Paleo-Indian points. Several possibilities remain.

Dalton

The Dalton period is not included within the traditional eastern United States temporal designations. However, it has been used in Missouri (Chapman 1975) and elsewhere, and is dated between 10,000 and 9000 years ago (Chapman 1975: 29). The major diagnostic artifact of the period is the Dalton point, a lanceolate point with deeply concave base, often basally thinned, but rarely fluted. They were first named at the Dalton site on the lower Osage River in Missouri (Cole County), but are widespread throughout the eastern United States (Tuck 1974).

In spite of the ubiquity of Dalton points, the nature of Dalton settlement systems is poorly known. A running battle in the southeastern U. S. literature has pitted the interpretations of Dalton settlement by Morse (1973, 1975, 1977) against those of Schiffer (1975) with Price and Krakkar (1975) also entering the fray. No good confirmatory evidence is available for any point of view, however.

In the Truman Reservoir, the only Dalton component known in 1975 was that at Rodgers Shelter. Only a few

other scattered finds of Dalton points had been reported (Wood 1957: 10, Wood 1961: 100). Yet, as noted by Roper (1977: 21), the repeated occupation of Rodgers Shelter by Dalton peoples and the sporadic finds of Dalton points seem to argue for some sort of regular use of the area. The problem for the survey was to locate additional sites, if possible. The survey did indeed record additional Dalton material, including both Dalton and Plainview points. Other specimens were observed in private collections. Along with this work, however, also came the realization that the scarcity of Dalton was at least partly due to the fact that they were buried in the Holocene alluvial sediments of the same formation as represented at Rodgers Shelter. It was also learned during the survey that this formation is present along all major streams in the reservoir.

Four problem areas are thus posed. The first is the location of additional sites of this period, necesary if we are to learn how the Dalton occupations at Rodgers Shelter contrasted with or complemented other Dalton manifestations in western Missouri (cf. McMillan 1976c: 224). Locating such components is dependent upon either fortuitous finds of such sites as they are exposed by fluvial processes or upon systematic subsurface survey via coring or trenching. The latter in particular has merits. Coring is cheaper and faster, but it results in exposure of such a small volume that it can potentially miss low density sites. Backhoe trenching provides a far better exposure and has been used with notable success for location of buried sites in Tennessee (J. Chapman 1975), although with low density sites, there is still considerable risk of not locating material to place sites in time.

The second problem area is obtaining absolute dates for the Dalton occupation. Previously, only two such dates were available in the central Osage River basin, both from Rodgers Shelter, and both actually falling within the Paleo-Indian period, even though associated with Dalton material. A larger set of dates, from more sites, is important for establishing the accuracy of the local chronology.

The third problem area associated with Dalton occupation is the determination of the nature of the occupations in the Truman area. The Dalton occupations at Rodgers Shelter were observed as a series of small campsites, each about 10 m in diameter, and centered around an open fireplace (McMillan 1976c: 223). Similarly, a small bank profile at 23SR469 on the Osage River showed a small horizontal dimension and a light debris density (Piontkowski 1977), while test excavations at the Montgomery Site (23CE261) on the Sac River in the Downstream Stockton area suggested that the occupation contained small living floors

with charcoal, burned earth, and debris scattered over a few meters (Collins, et al. 1977: 89). The problem then is, if possible, to isolate other Dalton components to assess their size and structure, to obtain data on the associated assemblages.

Finally, more data are needed to explain the observed Dalton settlement pattern. Joyer and Roper (1980: 18) have reported that most Dalton sites are found along major streams and very close to them. They further note that "survey in small stream valleys, on Pleistocene terraces, and in uplands has so far yielded sparse evidence of Dalton occupation" (Joyer and Roper 1980: 18). Explanation of what seems a very skewed settlement pattern is deemed essential to a full understanding of the nature of Dalton settlement.

Archaic

The Dalton period is followed by a long Archaic period, traditionally subdivided into the Early, Middle, and Late periods. It is variously dated but is generally considered to end around 3000 B.P. (1000 B.C.; Griffin 1967: 178; Chapman 1975: 27; Funk 1978: 16, etc.). Virtually by definition, the Archaic is post-glacial and pre-ceramic. It is characterized by a wide variety of projectile point styles and by an increasing localism in expression of styles. It is also characterized by the use of a wide variety of flora and fauna with an increasing local specialization, and by major population increases through the six millennia that are considered to comprise the Archaic period.

Several Archaic sites were known in Truman Reservoir prior to 1975. Rodgers Shelter was, of course, the major Archaic site known in the reservoir; however, Phillips Spring was known to contain one or more Archaic components (Chomko 1976), Archaic remains were recognized at Blackwell Cave (Falk 1969), and several open sites were interpreted to contain Late Archaic components. The Cultural Resources Survey added considerably to the inventory of recognized Archaic components (Roper 1977, Joyer and Roper 1980) and recognized styles not previously known to be represented in the reservoir area.

Nevertheless, numerous problems remained (or were generated) for later resolution. The first of these is definitional and is a problem noted by Roper in 1977:

> Just what are the Paleo-Indian, Dalton, and Early Archaic periods? (1) Are they merely dominant point forms? . . . (2) Are they time periods? . . . (3) Or are Paleo-Indian, Dalton, and Early Archaic

> different kinds of adaptations to late glacial and immediate post-glacial environments (Roper 1977: 22-23).

In addition to all of these, Archaic has also been implicitly used as a pattern (cf. Griffin 1946: 42, Sears 1948), and explicitly as a stage (Willey and Phillips 1958: 104-138; Jennings 1968: 109-114), and a tradition (Willey 1966: 60-63).

The taxonomic problem is readily apparent in the literature of the Ozark Highland. For example, McMillan (1976c: 223-226) presented a series of Culture/Time Stratigraphic Units (C/TSU's) for Rodgers Shelter, assigning them a time span – generally based on radiocarbon dates and sedimentation rates – and a cultural affiliation (Dalton, Middle Archaic I, Middle Archaic II, and so on). These C/TSU's are defined (McMillan 1976c: 223) as "discrete adaptive patterns for the human record at Rodgers Shelter," and are themselves given dates that do not necessarily correspond with those that Chapman (1975: 27) uses in Missouri. McMillan's definitions (1976c: 224-225) for Middle Archaic I and II, however, make it clear that his major criterion for assignment of cultural affiliation was form of adaptive pattern. Chapman (1975), however, has assigned the same occupation that McMillan refers to as Middle Archaic I to Early Archaic, largely because of the time during which it occurs (Chapman 1975: 130). Kay (1978c) has similarly called the occupation Early Archaic.

The point is that none of these labels are wrong, because all of them are assigned using different criteria. If adaptation to an encroaching prairie, produced by ameliorating climate, is the definition of Middle Archaic and if McMillan interprets the evidence from C/TSU's 9 through 5 as representing such an adaptation, then he is correct in labelling the C/TSU 9-8 occupations as Middle Archaic. On the other hand, if Chapman defines occupations between 9000 and 7000 B.P. as Early Archaic, then he is equally correct in calling the C/TSU 9-8 occupations Early Archaic.

Neither of these, however, was helpful to Roper for organizing the collections from the Cultural Resources Survey. Since neither chronological nor adaptation data *per se* are inherent in a survey collection, another criterion was needed. Therefore, the so called "type-fossil" approach was used, whereby a set of styles (generally of projectile points) were associated with each other and were used to represent a taxon. The problem was what to call the set of styles. For example, do we call point styles in C/TSU 9 and 8 at Rodgers Middle Archaic, following McMillan, or Early Archaic, following Chapman? An initial attempt to recognize Early, Middle, and Late Archaic occupations

(Roper 1977; Joyer and Roper 1980) never seemed satisfactory and the Early and Middle Archaic were later left undifferentiated (Roper and Piontkowski 1979). This, of course, leaves a large corpus of material, representing perhaps 4000 years, undifferentiated and obviates the ability later to examine their temporal distribution. More seriously, it also obviates the ability to communicate. Clearly, it is necessary to devise some other taxonomic system. This problem is not unique to the Early Archaic and we will return to it below.

The other problems are similar to those described for Dalton. If definition of cultural complexes on the basis of diagnostic point styles is difficult, it is in part because of the scarcity of such sites. It is obvious therefore, that the location of additional components of Early and Middle Archaic sites in particular will be important if we are to be in a position to construct useful taxonomic units and go on to other problems. As with Dalton sites, it will be necessary to search for buried sites in order to accomplish this task.

Absolute dating will also be of importance, when possible. Some dates are available from Rodgers Shelter; however, results of the Cultural Resources Survey suggest that the Rodgers sequence by no means duplicates the entire range of styles that are assignable to the Archaic. Although many of these styles are typologically similar to those found elsewhere in the eastern United States and Plains and dated at some of those sites, their temporal position in Missouri is unknown. If we are to understand the dynamics of the prehistoric occupations east of the Rockies and their interplay with the dynamics of the natural environment, then it is important to place these occupations in time.

Finally, it will be important to evaluate total assemblages from a variety of sites in order to determine the position of each component in the prehistoric Ozark settlement system and the position of the Ozark settlement system in the wider eastern United States. At present, little is known about Early and Middle Archaic settlement systems. McMillan's (1976c: 224-225) interpretation of Rodgers Shelter suggests that it served as a base camp during this time. The interpretation of the Wolf Creek site on the Osage River (Piontkowski 1977; Joyer and Roper 1980: 18) suggests an occupation similar to those described for Dalton. Beyond this, however, we have few clues to the morphology of Early and Middle Archaic settlement systems.

Late Archaic sites pose a somewhat different set of problems. For one thing, location of additional components,

while still important is less critical, for the Cultural Resources Survey did indeed record a large number of sites with Late Archaic components. The most vexing problem, however, is the interpretation of variability within Late Archaic assemblages. A variety of point styles correlate with Late Archaic occupations (Roper and Piontkowski 1979). Repeated associations of most of these forms suggests that time and space alone do not suffice to account for variability, although Joyer and Roper (1980: 20) have noted some regional differentiation in distribution of styles. Nicholas (1978) considered the problem from a functional point of view but was unable to come to any strong conclusions regarding the meaning of Late Archaic variability. It is unlikely that we will be able to solve the problem during the present investigations.

In spite of the relative abundance of Late Archaic remains and the likelihood of obtaining additional such material, the nature of the Late Archaic settlement system in the Ozarks and its articulation with the wider complexes with which it compares remains unknown. We would anticipate that this matter would be more amenable to investigation within the logistical constraints of this contract. How settlement systems are to be approached is discussed in the next section.

Woodland

The long Archaic period is followed by a considerably shorter Woodland period (3000 - 1000 B.P.), also subdivided into Early, Middle, and Late. The term Woodland itself was introduced as a Pattern (originally Basic Culture) of the Midwest Taxonomic System and included grit-tempered, elongate globular (conoidal), often cord-marked ceramics, comparatively large, stemmed or notched projectile points; primary and secondary burials, in mounds, with comparatively sparse grave goods, etc. (Deuel 1935; McKern 1939; Anonymous 1943). It was extended to designate a temporal stage by Griffin (1946). This is also the sense in which Chapman has used it in Missouri:

> Woodland is the term that seems to have been used the most to describe the cultural developments that took place in the relatively short period from 1000 B.C. to A.D. 900 in the central Missouri-Mississippi valley, which encompasses the present state of Missouri (Chapman 1980: 2).

As with the Archaic, therefore, the taxon has been used to refer to a complex of traits, or pattern (Anonymous 1943; Deuel 1935; Cole and Deuel 1937), a period (Griffin 1946, 1952, 1964, 1967; Chapman 1947-48, 1952, 1980), a tradition

(Willey 1966: 267, 292), and an adaptation to forest and riverine products of the Eastern Woodlands – particularly deer, turkey, nuts, fish, and mussels, with limited use of cultigens including not only corn, beans, and squash, but also products of an "eastern agricultural complex." By definition, however, it is generally accepted that the beginning of the Woodland is heralded by the introduction of ceramics, and that construction of burial mounds, the possible practice of horticulture, and later, the introduction of the bow and arrow (cf. Willey 1966: 267).

Woodland, or what have been interpreted to have been Woodland, sites are abundant throughout the Truman Reservoir area. Classification always has been difficult, however. The only site ever referred to as Early Woodland is that at Boney Spring where ceramics, contracting stemmed points, and floral remains were associated with C-14 dates of 1900±80, 1910±80, and 1920±50 B.P. (Bass and McMillan 1973; King and McMillan 1975). There is nothing about the ceramics to suggest a similarity to anything referred to as Early Woodland anywhere else, the assignment seems to be made purely on the basis of dates, which actually fall during the Middle Woodland period.

As for Middle Woodland, some, but still sparse, evidence has been reported. Only "a few sherds" (McMillan 1976c: 226) were recognized as Middle Woodland (i.e., Hopewell) at Rodgers Shelter; Wood (1961: 102) assigned Component C at Blackwell Cave to Middle Woodland; and a few "Hopewellian" sherds were recovered from shelters in Stockton Lake (McMillan 1966: 182) and St. Clair County (Chapman 1965, 1980: 27). The Cultural Resources Survey recovered no additional Middle Woodland pottery, although projectile points assignable to Middle Woodland occurred in some quantity. However, nowhere was there found the diverse assemblage of chipped stone tools that frequently characterizes Middle Woodland elsewhere in the Midwest (Roper 1977: 179).

Most of the Woodland material is generally referred to as Late Woodland, even though its temporal provenience is often entirely unknown. A few efforts have been made to formally classify these remains; however, none of them have been satisfactory. Stratigraphic sequences have been unclear, absolute dates in short supply, and potentially diagnostic material has not been sufficiently thoroughly compared with that external to the reservoir area.

Organization of the collections from the Cultural Resources Survey was therefore difficult. First of all, there were almost no ceramics recovered. Thus, even presence/absence, let alone style, of ceramics was not a valid diagnostic. Projectile point studies identified

a large number of specimens but still left a large number unidentified. Many of these were probably referrable to a Woodland occupation, but could not be substantiated as such.

Excluding the use of ceramics, therefore, the end product of the analysis of the Cultural Resources Survey collections defined at least 3 (probably) Woodland complexes. One of these was the group of corner-notched specimens that were glossed as Snyders, although it clearly contained variants. Sparse additional information is available for this complex. Certainly these types of points do occur in burial mounds (Wood 1967) and occasional other Hopewell traits, such as cut wolf maxillae and a mammiform object have been found (Wood 1967), suggesting Hopewell influence. These mounds nevertheless have been classified with the Fristoe Burial Complex, which is largely regarded as Late Woodland.

The second Woodland complex defined was that represented by contracting stemmed points: Gary and Langtry (or Standlee). These had previously been grouped with other types and were included in Wood's (1961: 91) Lindley Focus. However, the evidence from a large number of sites suggested a nearly mutually exclusive distribution of contracting stemmed forms and the Rice Side-Notched, etc. forms that were also included in the Lindley Focus. There is evidence to suggest that Langtry and Gary should not be grouped together, either. These two forms also seem to occur in nearly mutually exclusive distribution with each other. Purrington (1971: 122) in discussing the origins of both forms concluded that they may have originated independently.

The temporal placement of this complex (or these complexes) is entirely unknown. Dates of A.D. 715$\pm$95 and A.D. 1390$\pm$100 at the Flycatcher Site and A.D. 1485$\pm$100 at the Dryocopus Site, both in Cedar County in the Stockton Reservoir (Pangborn, Ward, and Wood 1967: 21; Calabrese, Pangborn, and Young 1969: 39), imply a Late Woodland temporal provenience. However, Purrington (1971: 122), Scholtz (1969: 55), Hoffman (1969: 40), and Chapman (1980: 308-310) all consider contracting stemmed forms to go back to at least the Late Archaic. Scholtz (1969: 55) would even consider the Middle Archaic.

The final Woodland complex delineated in the Truman collections was that represented by Rice Side-Notched points and Scallorn and other arrow points. Virtually all recorded ceramics, except for those clearly Hopewell, were associated with this complex — none were associated with the contracting stemmed forms. Ceramics largely have coarse paste, and are heavily limestone-tempered, poorly fired, and crumbly. Rice Side-Notched and arrow points also occur in large quantity in the Fristoe Burial Mounds (Wood 1967).

The time of this complex is with greater confidence placed during the Late Woodland period, although there are few absolute dates available for verification. These latter are mostly from burial mounds and do, in fact, largely fall during the Late Woodland period.

Beyond these three complexes of Woodland remains is a large assortment of unidentifiable specimens, largely corner-notched forms (see Roper and Piontkowski 1979). On the basis of their co-occurrence with other forms in surface collections, the description of similar unidentified forms in previous literature on surveys and excavations in the Truman, Pomme de Terre, and Stockton Lakes area, it is presumed that many of these are assignable to the Woodland or Late Archaic occupations.

Also known to be present in collections from sites, particularly rockshelters, in the Truman area are ceramics diagnostic of cultural expressions external to the Truman area. These include Steed-Kisker, centered in the Kansas City area of Missouri; Pomona, centered in eastern Kansas, including the upper Osage River drainage; and Caddo, centered from the Arkansas River valley of eastern Oklahoma and to the south (Carlson 1977). These are mostly identified either from reports of excavations made in the past, from examination of collections from these excavations that are curated at the University of Missouri-Columbia, or by consultation with specialists in these surrounding areas. They are generally intermixed with points and ceramics of the Rice Side-Notched - Scallorn point - limestone-tempered pottery complex.

The Cultural Resources Survey was thus able to make some strides in sorting out the Woodland complexes. It left many questions, however, including the relative and absolute temporal positions of the observed complexes and their validity as defined. The five field and laboratory activities specified above should answer some of these questions.

As with the Archaic, little is known of Woodland settlement systems or of total material assemblages. Again, validation of complexes, and examination of single components of each will allow construction of assemblage and site type definitions.

Discussion

Emphasized throughout this discussion have been taxonomic problems. These have probably been the single most important source of difficulty with the understanding of the prehistory of the western Ozarks. In a study of the

validity of the Woodland taxon and its applicability to the Ozarks, Roper (1979b) concluded that a major barrier to understanding cultural dynamics in the Ozarks has been the rigid imposition of the MTS or transformed MTS-plus-periods upon the phenomena of the Ozarks. To this day, few units finer than Woodland pattern have ever been created for the Ozarks material, Wood's (1961) scheme nowithstanding, and, as just seen, placement within almost any period unit, from Early Archaic on, causes problems.

In the present analysis, therefore, we will propose a new taxonomic framework for the Truman Reservoir material. The terms Early, Middle, and Late Archaic, Early, Middle, and Late Woodland, and Mississippian will be used solely to designate temporal periods and then, to avoid confusion, for comparative purposes only. Otherwise, our basic unit will be the phase, in the sense of Willey and Phillips (1958: 22):

> an archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived, whether of the same or other cultures or civilizations, spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time.

Thus, our end product will more closely resemble that of Baerreis (1951) or Purrington (1971) than any of the preceding taxonomies in the Truman Reservoir.

Settlement Systems

THE ANALYSIS OF SETTLEMENT SYSTEMS IN THE TRUMAN RESERVOIR

The second of the three major themes of the Truman project investigations is the study of settlement systems. This has been an important aspect of the University of Missouri Corps of Engineers-funded investigations in Truman Reservoir since 1975, therefore, it will be useful to go back to the beginning of the Cultural Resources Survey and briefly discuss its background. While the strategy used in that work was not completely successful, analytically at least, a consideration of why it was not led to the strengthening of research strategy used in this contract.

Originally, it was intended to use an approach to the Truman data that was similar to that used by Roper (1975a) in the Sangamon River valley of central Illinois. The intended procedure was outlined by Roper and Wood (1975) and more fully explained by Roper (1975c). There were two critical elements to this approach. The first was the widely used concept of settlement patterns as explicated by Struever (1968: 135):

> The analysis of kind, number, and distribution of material elements recovered from an archaeological site, therefore, enables the archaeologist to define tool kits, activity sets, and hopefully, activity areas. These are the building blocks upon which settlement types are defined. Sites in which a particular configuration of exploitative and maintenance activities were carried out will disclose a similar structure of material elements; all such sites are representative of a single settlement type.

The second critical element was the understanding that these settlement types are distributed over the landscape in a manner reflective of the strategy used by the community for interacting with its biophysical environment.

From this, a series of analytical tasks were to be performed on the survey data:

1. Formal analysis of artifacts, particularly the projectile points, would be performed. This would draw on the Rodgers Shelter sequence and on that at a series of rockshelters in St. Clair County. One of the major purposes of this formal analysis would be chronology.

2. Functional analysis of the survey collections would be undertaken. This analysis would be of precisely the nature specified by Struever in the above cited passage and would draw on the "activity indicators" used by Ahler and McMillan (1976) in their analysis of changing activity configurations at Rodgers Shelter.

3. The distribution of sites would be examined in relation to features of the natural environment. This was to be done using techniques similar to those used by Roper (1975a) in her site-catchment analysis of Woodland settlement in central Illinois, and would draw on descriptions of biotic resource potentials and geomorphic features, to be prepared during the first year of the project.

The intended form of analysis was that stated as follows:

> Using temporal and functional designations of the sites, analysis of these data [i.e., site location data] will allow testing hypotheses concerning differential settings of functionally distinct sites and concerning temporal and spatial change in settlement patterns (Roper 1975c: 9).

An attempt was made to perform these analyses, but the results were never felt to be satisfactory. There were probably three reasons: (1) the chronology was never

sufficiently controlled; (2) it was not possible to speak of site types beyond the level of single or multicomponent sites, or those characterized by the presence of a particular point type or types; and (3) an improper frame of reference was probably being employed – that is, one that is derived from, and functions well in, areas that have a moderately long history of investigations such that the chronology is reasonably well controlled, the most prominent functional types of sites are known, and criteria for their recognition on the basis of surface collections can be generated. Since this is not the case in the Ozarks, like the chronology, the settlement system must be considered as largely a terra incognita and built from the ground up.

In so doing, a critical examination of the results to date suggest that the theory employed must be one capable of explaining a high degree of site homogeneity and randomness of location. In other words, it is possible that archeologists have been so conditioned to examining settlement systems in places like Illinois or even central Missouri where change is apparent and site differentiation is obvious, that they consider that failure to observe it in an area is due to insufficient data. We have taken the opposite stance; we feel that with data from over 1400 sites, we are observing reality, not sampling accidents. We believe that procedure for analysis of settlement systems calls for us to proceed as usual while fully expecting that our results may show a high degree of randomness of location and homogeneity of contents. We realize that this makes interpretation harder, but we believe that the contrast between the Ozark border and contemporaneous events in areas that today lie a mere two hours drive away (e.g., the Kansas City area or the Big Bend area of the Missouri River) is of great interest and no little importance in understanding cultural dynamics.

Accordingly, the process for settlement system analysis in the Truman Reservoir may be stated as:

1. Generation of environmental descriptions.

2. Generation of predictive models and settlement pattern models from survey data.

3. Development of a model of hunter-gatherer settlement that will transform settlement pattern models into a model of a settlement system.

4. Derivation of implications for field strategy.

5. Fieldwork.

6. Performance of analysis of collections:
   a. Chronological
   b. Lithic and other artifact formal-functional analysis
   c. Floral and faunal remains, if available

7. Generation of refined settlement pattern and settlement system models for southwest Missouri.

CONCEPTS IN SETTLEMENT ANALYSIS

Important to the study of settlement patterns and settlement systems is a model of hunter-gatherer settlement that is capable of organizing observations on archeologically known societies. Such a model was available at the beginning of this project in 1977. The topic of hunter-gatherer subsistence and settlement happens, however, to be a current major topic in American archeology. The same period during which investigations of this contract were performed has witnessed, or is witnessing, an explosion in the literature of hunter-gatherers. The following discussion reflects the influence of work done during the late 1970's but is largely an exposition of the basic approach to settlement systems as seen in 1977 when this project was organized.

To accomplish the settlement analysis in the Truman Reservoir, a critical distinction is maintained between a settlement pattern and the settlement system. A <u>settlement pattern</u> is used in the sense defined by Winters (1969: 110): "the geographic and physiographic relationships of a contemporaneous group of sites within a single culture." This makes a distinction between "man-man" and "man-land" relationships, or those between sites and features of the biophysical environment. Most methods of locational analysis (or settlement pattern analysis) will emphasize one or the other, and its specifics will determine the data collected and the techniques used to analyze them. The observed pattern is thus dependent upon the technique used in its description. Obviously, a variety of patterns may be described in the same body of phenomena. In other words, a settlement pattern is a static description of relations among and between sites. As such, it is one of a variety of possible descriptions that could be made on the same body of phenomena and is a construct of the archeologist.

The <u>settlement system</u>, on the other hand, is the dynamics of the behavior that produces the settlement pattern. It is what is being modelled in MacNeish's (e.g., 1964) maps of sites in the Tehuacan Valley of Mexico. Winters

(1969: 110) defines it as "the functional relationships among the sites contained within the settlement pattern." There is only one "correct" reconstruction, or model, of the system. Arriving at it requires a theory of how settlement systems are structured and how they translate to the archeological record.

A number of theoretical models of hunter-gatherer settlement and subsistence have been proposed but few of them have actually been tested. The crucial test of the utility of any theory, however, is its ability to model a wide variety of phenomena. A theory that had no cases to which it is applicable would be said to have no empirical content. A theory that represented settlement systems in, for example, glaciated central Missouri, but not those in the contemporaneous Ozarks would be said to have less empirical content than one that could explain both. The latter would be the most useful (cf. Lakatos 1970; Morwood 1975: 114).

Between general theory and the archeological record stands a great, and as yet largely unexplored, body of middle-range theory, or formation processes (cf. Binford 1977: 6). It is middle-range theory that explains how the material products of past human behavior are actually distributed across the landscape, and how those distributions may subsequently be distorted by actions of humans, animals, fluvial processes, diagenesis, etc. Study of the former, variously termed as cultural formation processes or ethnoarcheology, is currently receiving much attention (e.g., Kramer 1977; Binford 1978; Yellen 1977; Rathje 1979; Watson 1979); the latter, natural formation processes, are also being studied (e.g., Gifford 1977; Wood and Johnson 1978). Until such studies have been systematized, archeologists will be at a disadvantage in truly explaining their phenomena. Meanwhile, they will have to be content with an interpretation of their data based on a rough translation between general theory and the archeological record. Nevertheless, it is useful to attempt to make that translation and approach the Truman Reservoir with some proposed understanding of how settlement systems, particularly of hunter-gatherers, are generated.

MODELS OF HUNTER-GATHERER SETTLEMENT SYSTEMS

Currently used models of hunter-gatherer settlement systems isolate three major subsystems: subsistence, location, and population dynamics (Jochim 1976, Carlson 1979). The technological subsystem is an important fourth subsystem while the role of the supra-systemic environment is also critical to model formation.

In this paradigm, the nature, quantity, and distribution of natural resources (including flora, fauna, minerals, and water) are essential determinants of subsistence practices. Human populations are, however, selective eaters. That is, they do not make use of all foods classified as edible. Nor do they make proportional use of selected foods. Rather, they differentiate foods and make their selection according to a complex set of criteria.

How populations select the food they eat, determine the use schedule, and select the criteria that go into deciding which resources will be valued ahead of others are considered by several recent students of hunter-gatherer subsistence. At base is a proposition similar to that stated by Asch, Ford, and Asch (1972: 27) that

> a human population will take those food resources which are most easily collected in large quantity and which are most nutritionally complete.

Jochim (1976) considers attainment of a same level of food and manufacturing needs and maintenance of energy expenditure within a predefined range as major goals in the scheduling of resources. Reidhead (1976: 9) hypothesizes that

> the primary objective of . . . peoples . . . in their food procurement decisions and activities was to minimize labor in the production of a nutritionally adequate diet.

Both Jochim (1976) and Reidhead (1976, 1980) along with Carlson (1979), Keene (1979), and Smith (1974, 1975) have developed predictive approaches to subsistence, based on available resources and productivity attributes of those resources. Use of such approaches requires: (1) some knowledge of which resources were used (less important in Carlson's and Reidhead's models than in Jochim's and Smith's), and (2) a basis for evaluating the spatial and seasonal availability and productivity of the selected resources, both in terms of quantitative yields and, in some models, nutrition.

While subsistence practices do not determine settlement arrangements, location and mobility decisions and demographic arrangements are largely responses to the distribution and abundance in time and space of chosen resources. Settlement strategy and the deployment of population aggregates therefore are mutually part of a strategy to hold energy expenditure to a minimum while procuring a sufficient supply of foods, minerals, water, and other perceived necessities.

Since communities interact with and extract energy from the territory immediately surrounding the loci they inhabit, and since in so doing, they tend to deplete resources, the strategy for deployment of population aggregates and for moving from place to place will be correlated with the seasonal and spatial abundance of those resources chosen for exploitation and with the behavioral habits of the prey species. A number of factors influence the way settlement strategy is played out against resource dispersion. Among these are the security and prestige of the resource, factors that largely work opposite one another (Jochim 1976: 53-54). In Jochim's (1976: 54-55) model then, the hierarchy of importance of resources generated by differential values assigned them structures a series of concentric zones around a locus: (1) that zone providing shelter, a view, fuel, and water - low prestige, high security, immobile resources, (2) that zone providing vegetable foods and small game - low mobility, low prestige, and high security resources, and (3) that zone providing large game - low security, high prestige, high mobility. Jochim (1976: 58-59) then uses a gravity model to predict locations of sites: (1) closer to less mobile resources, (2) closer to denser resources, and (3) closer to less clustered resources.

However, where to locate sites is only part of the equation, when to move them and how many people to put in them is the other part. Seasons may change, bringing with them availability of some resources, unavailability of others, and continued exploitation of others may deplete nearby quantities and necessitate a greater expenditure of energy than the resource is deemed worth (in effect, placing the only available quantities in the zone beyond that in which it is normally exploited). Mobility strategies have been explored by Carlson (1979), who notes that: (1) the more often the camp is moved, the lower the net cost of exploitation from a single camp, but (2) the more often the camp is moved the greater the net cost of moving (Carlson 1979: 112). However, as resources are depleted it becomes less and less efficient to exploit them from a given locus and more and more efficient to exploit them from a new locus. A move is likely at this point (Carlson 1979: 114, see also Roper 1979a: 12). However, as is pointed out by both Jochim (1976: 61) and Carlson (1979: 117) any move may involve all or only part of the population. Jochim (1976: 61) refers to this as use of base camps vs. satellite extraction camps; Carlson (1979: 117) following an unpublished manuscript by Binford refers to these as residential vs. logistical mobility (see also Binford 1980) and predicts that

> Residential mobility is expected when resources overlap spatially or when group movement is easy and where resource diversity is high and aggregations of resources are low (Carlson 1979: 133).

and that

> Logistical mobility should be found where the spatial separation of resources makes base camp placement with respect to all critical resources impossible or when game animals roam over a more extensive area than can be monitored from the base camp alone (Carlson 1979: 117-118).

Any number of possible combinations of residential and logistical loci are thus possible. The exact strategy will depend on several factors, including zonation and spacing of resources, their seasonal availability, and the organization of the population.

The relationship between population and resources is actually very simple. The larger the population aggregate, the more food required, the greater the territory that must be exploited. Therefore:

> The greater the degree of spatial concentration of resources, the greater the yield of a single site catchment . . . ., the larger can be the co-residing group. Conversely, the more dispersed the resources, the smaller the catchment yield, and thus the smaller the group supportable (Jochim 1976: 66).

The relationship is well-illustrated by Hassan (1975: 39-40).

It still remains to relate exploitation to certain dispersion characteristics of natural resources. Such a relationship has been alluded to but not yet systematized in this discussion.

Natural resources are not everywhere available. Water occurs in well-defined places which may be distributed in high or low density in a region. Vegetation is highly correlated with topography, exposure, soil, water, and elevation. Fauna is highly correlated with vegetation distribution. Therefore, from one region to another there may be major variation in distribution of resources. These variations may require differential settlement strategies in order to achieve the settlement goal of reducing energy expenditure. Narrowly spaced zones will be more likely to support base camps at the heart of the system, perhaps with extraction camps in farthest zones to supply the highly mobile, high prestige items such as large game.

These base camps may be occupied by relatively large groups. How large the population aggregates may be will depend upon the density of resources within economic range of the site, i.e., the population may be as big as is allowed by the supply of resources within a distance of the camp such that it never requires more energy than is permissible to exploit them. More widely spaced zones are more likely to require the sequential occupation of residential camps, moved from time to time as resources within economical distance are exhausted (cf. Roper 1979a: 14-15). Such camps are likely to be occupied by smaller population aggregates.

IMPLICATIONS

Two mistakes are commonly made in attempting to study hunter-gatherer settlement systems. One is not realizing that as yet these models are not fully operationalizable archeologically; the other is not taking any cognizance at all of how settlement systems operate. The task then is to find some sort of middle ground between a naive, whole-hog interpretation of phenomena in terms of, for example, Binford's (1980) discussion or Cleland's (1976) focal-diffuse model, and a total disregard for any sort of theory.

What fully operationalizing theory will require, in addition to better development of middle-range theory, is the development of scales of measurement. Until this time arrives, however, use of surrogate measures and analysis by comparison will help in examining differences among sites within settlement systems and between systems. This, for example, is the approach used by Carlson (1979) in examining twelve Middle Archaic components at the Koster site in Illinois. The present task then is to derive from the model a series of implications for site location, site attributes, and site contents. For the Truman Reservoir, where faunal and floral remains are largely not preserved, these implications for site contents are confined to those that pertain to stone tools.

Implications are derived for three types of sites: base camps, residential camps, and extraction camps. These three types follow those of Carlson (1979: 126-127) and are defined as follows:

1. Base camps are occupied by a community, that is, a population aggregate "sufficiently organized and differentiated to insure both biological and cultural continuity" (Clifton 1968: 17). The occupation lasts through at least one and perhaps more seasons of the year. Major resource procurement takes place from the base camp; however,

extraction camps may be occupied for short periods of time by small segments of the population, and serve to provision the base camp.

2. Residential camps are also occupied by a community. However, they are occupied for the purpose of exploiting nearby resources and are likely to be moved when those resources are exhausted. Residential occupations are therefore sequential throughout all or part of the year.

3. Extraction camps are small short term locations. They are likely to be occupied by only a segment of a community for purposes of exploiting resources not efficiently procured from a base camp.

Given these definitions, therefore, we may derive implications for site locations, site characteristics, and site contents for each type, as follows.

Site Location

1. Base camps are more likely to be strategically located in relation to those immobile resources that are most secure (high predictability, large quantity) and thus will exert the greatest "pull" on location. In addition, however, such sites are also the most likely to correlate with site specific factors such as elevation above probable levels of most floods, level ground, well drained soil, shelter from nearby hills, coupled with favorable exposure. In a region, the kinds of places in which such sites are to be found are likely to be constrained and highly predictable.

2. Residential camps are also likely to be strategically located in relation to high security, low mobility resources. The security level, however, may not necessarily be as high as that of base camps. Siting characteristics may not necessarily be as carefully chosen. The kinds of places in which these sites are to be found may not be highly predictable and may in fact appear to be random.

3. Extraction camps are most likely to be placed in those places where procurement of one or only a few selected, high-yielding but also highly mobile and highly valued resources may be taken. Site characteristics are apt to be highly variable. Kinds of places in which such sites are to be found will, however, be reasonably predictable, given some knowledge of the habits of the prey.

Site Characteristics

1. Base camps are likely to be the largest sites in the settlement pattern. Their debris distributions will be dense and middens are most likely on these sites. Structural remains are the most likely on these sites and may be substantial. Storage facilities, if present at all, will most likely be associated with these sites.

2. Residential sites are likely to be smaller and have lighter debris densities. The apparent exception to this will be the sort of place that is repeatedly visited but where the exact locus is not reinhabited. Middens are not likely, unless resources such as mussels with high-waste to usable part ratios were being exploited. Structural remains may be present, but if so, will be smaller and flimsier than those in a base camp. Storage features are less likely, but if present, will be small and irregular.

3. Extraction camps will be the smallest of all and have very light debris scatters. Middens, structural remains, and storage features will not be present.

Site Contents

1. Base camps should contain a large and diverse tool kit. It will be such a sedentary or semi-sedentary type of situation that we might expect the greatest specialization of tool forms. Manufacturing debris should reflect all stages of production with the possible exception of some of the very earliest stages in reduction. Manufacturing/maintenance debris ratios should be high.

2. Residential camps may also contain a diverse tool kit; however, it is more likely that a premium will be placed on less diversity of forms and more multipurpose unspecialized forms. Manufacturing debris is still likely to reflect all stages of manufacture but, in fact, both debris and tools may vary from one site to another as exigencies at the time of occupation are met.

3. Extraction camps are likely to contain only tools associated with procurement and preliminary processing of one or a few resources and may in fact have only worn-out or broken and discarded specimens. Manufacturing debris is likely to be sparse; the bulk of the debris will result from tool maintenance.

Our examination of prehistoric settlement in the Truman Reservoir area will focus on the identification of the elements of settlement patterns and their integration into settlement systems.

Cultural Continuity

Students of the human experience, be they anthropologists, sociologists, folklorists, or practitioners of other disciplines, have often identified a particular salient characteristic of Ozark lifeways. That is, Ozarkers are a rural, conservative folk. Rafferty (1980: 3), a geographer, expresses it succinctly; he says that as a region, the Ozarks are

> set apart physically by rugged terrain and sociologically by inhabitants who profess political conservatism, religious fundamentalism and sectarianism, and a strong belief in the values of rural living.

Studies such as those of Plainville, U. S. A. (West 1945) and Plainville Fifteen Years Later (Gallaher 1961), as well as Rafferty's (1980) own recent regional geography of the Ozarks nicely demonstrate contemporary and recent cultural conservatism.

The literature of Ozark archeology is also replete with references to prehistoric Ozark cultural conservatism. Chapman (1952) several times makes references to the prehistoric Ozarkers lagging behind their contemporaries elsewhere in the lower Missouri Valley. Baerreis (1959: 271) concludes that

> Portions of the Ozark region may well have comprised a marginal area in which cultures of an early stage persisted, gradually accepting some traits from more advanced cultures occupying surrounding areas.

and Wood (1961: 118) expresses his

> feeling that the Ozark Highlands [sic], even along its periphery, was a marginal area which tended to harbor peripheral manifestations and lagged behind adjoining areas.

Other authors have presented a similar argument (e.g., Purrington 1971; Vehik 1978).

To conclude that prehistoric populations were conservative does not explain conservatism; but how conservatism is to be explained has never been satifactorily answered. The factor of isolation has been put forth as a possible mechanism. For example, Chapman (1952: 140) states that:

> In the Ozark Highland . . ., there is evidence that the Woodland peoples were more isolated and received far fewer ideas and development was slower.

He suggests (Chapman 1952: 144) that

> the rough country of the Ozark Highland perhaps isolated the Woodland peoples to a large extent or at least discouraged invasions by the Mississippian groups.

The theme is reiterated in his recent synthesis of Missouri prehistory (Chapman 1980: 107). Wood (1961: 118) has also stated his "impression that group interaction and trade was not extensive" and suggests (ibid.) that meandering streams and rugged terrain may have been factors in determining interaction routes.

In essence, this explanation goes as follows: Why do the Ozarks appear uninfluenced by Hopewell and Mississippian? Because they were isolated. How do we know they were isolated? Because they are relatively untouched by Hopewell and Mississippian. Clearly, the argument is circular.

Other proposed explanations have suggested the role of environmental factors in promoting cultural conservatism. Martin, Quimby, and Collier (1947: 337) long ago postulated that

> in prehistoric times the [Ozark Plateau] was not suited for intensive settlement by large sedentary groups of the kind found near the bottomlands of the Mississippi.

More recently, both Purrington (1971: 556) and Vehik (1978: 48) have suggested that limitations in fertility and available area of bottomland were factors in prehistoric Ozark cultural conservatism. However, although Ozark bottomland soils are indeed limited in area, modern soil surveys have shown them to be quite fertile.

Purrington (1971: 556) and Vehik (1978: 49) have also pointed to the abundance of natural food resources in explaining cultural conservatism. In this argument, the Ozarks are seen as providing such a wealth of resources that the prehistoric inhabitants were able to maintain a diffuse economy (Cleland 1976) and effectively exploit their environment; therefore, they had no need for new innovations and resources. This argument, however, contains a fatal flaw in that it implies that resources are more abundant in the Ozarks than they are in areas that were less conservative. This simply is not true, however. A comparison of the yields of nuts in the forests of the Ozarks and the lower Illinois Valley (Roper 1978: 9) shows that the Ozark forests produce 1/8 to 1/10 or less the

yield per unit of area than do the forests of the lower Illinois Valley.

Roper (1978) therefore reversed Purrington and Vehik's argument. She compared nut yield data from the Pomme de Terre and Illinois river valleys and found the Pomme de Terre valley yields to be about 1/8th to 1/10th what they were in the Illinois River valley. Bottomland soils are every bit as fertile in the Osage drainage as in the Illinois, Mississippi and other drainages, however, they occur in very limited area. Bison may have occasionally been present in at least the western part of the Truman area, but certainly were not abundant in this tall-grass prairie margin. The only major economic resources that would have occurred in notable abundance would have been species such as deer and turkey. Neither species, however, is particularly conducive to group hunting. In short, the resource base, while it is highly diverse as argued by Purrington and Vehik, does not appear to provide sufficient quantities of the high yielding, predictably renewable resources that form the basis for sedentary occupations. Nor are vegetation zones highly differentiated. It was therefore concluded that the Ozarks resource base would best have been exploited by small mobile population aggregates.

A continuation of the argument suggests that Ozarks conservatism, which we actually prefer to label as continuity or stability, is not a product of isolation and lack of stimulus to change. Rather, it is viewed as the product of an inability to participate in developments such as Hopewell or Mississippian. These developments and others, such as the widespread interaction in evidence during the Late Archaic period, are argued to have taken place in the social and political domains. Participation was, however, incompatible with the mobility and settlement strategies required for coping with the resource structure of the Ozark Highland. The result was a rejection of or non-participation in the broad-scale developments that were occurring beyond the Ozarks.

Establishing the credibility of this argument is contingent upon the demonstration of a number of facts about the archeological record of the Ozarks. An important line of evidence will be settlement data. If the Ozarkers did indeed maintain a high degree of mobility, then we would expect the archeological record to show a distribution of site sizes that is unimodal and skewed toward the small end of the range. We would also expect a moderate diversity of tools with a relatively low ratio of curated to expedient tools. Evidence of structures, features, and middens would be sparse and intra-site debris patterns should be small-scale and perhaps random or nearly so. It has been a continuing theme of the Truman Reservoir investigations to confirm or modify these expectations about the archaeological record of the area.

REFERENCES CITED

Adams, Robert McCormick and Frank Magre
1939 Archaeological surface survey of Jefferson County, Missouri. The Missouri Archaeologist 5(2): 11-23.

Adams, Robert McCormick, Frank Magre, and Paul Munger
1941 Archaeological surface survey of Ste. Genevieve County, Missouri. The Missouri Archaeologist

Anonymous
1935 Light on Missouri archaeology. The Missouri Archaeologist 1(3): 4-6.

1943 The first archaeological conference on the Woodland pattern. American Antiquity 8(4): 392-400.

Asch, Nancy B., Richard I. Ford, and David L. Asch
1972 Paleoethnobotany of the Koster Site: the Archaic horizons. Illinois Valley Archaeological Program Research Papers 6 and Illinois State Museum Reports of Investigations 24.

Baerreis, David A.
1951 The preceramic horizons of northeastern Oklahoma. University of Michigan, Museum of Anthropology, Anthropological Papers 6.

1959 The Archaic as seen from the Ozark region. American Antiquity 24(3): 270-275.

Bass, William M., III and R. Bruce McMillan
1973 A Woodland burial from Boney Spring, Missouri. Plains Anthropologist 18(62): 313-315.

Berry, Brewton, J. E. Wrench and Carl Chapman
1940 The archaeology of Wayne County. The Missouri Archaeologist 6(1): 1-40.

Berry, Brewton, J. E. Wrench, Carl Chapman, and Wilber Seitz
1938 Archaeological investigations in Boone County, Missouri. The Missouri Archaeologist 4(3): 1-36.

Binford, Lewis R.
1962 Archaeology as anthropology. American Antiquity 28(2): 217-225.

1977 General introduction. In For theory building in archaeology, edited by Lewis R. Binford, pp. 1-10. Academic Press, New York.

1978 Nunamiut ethnoarchaeology. Academic Press, New York.

1980 Willow smoke and dogs' tails: hunter-gatherer settlement systems and archaeological site formation. American Antiquity 45(1): 4-20.

Bushnell, David I., Jr.
1904 Archeology of the Ozark region of Missouri. American Anthropologist 6(N.S.): 294-298.

Calabrese, F. A., Rolland E. Pangborn, and Robert J. Young
1969 Two village sites in southwestern Missouri: a lithic analysis. Missouri Archaeological Society Research Series 7.

Carlson, David
1979 Hunter-gatherer mobility strategies: an example from the Koster Site in the lower Illinois valley. Unpublished Ph.D. dissertation, Northwestern University. University Microfilms, Ann Arbor.

Carlson, Lisa G.
1977 Introduction to Truman Reservoir pottery. In Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project: Vol. V, Lithic and Ceramic Studies, pp. 169-211. Report to the U.S. Army Corps of Engineers. American Archaeology Division, University of Missouri-Columbia.

Chapman, Carl H.
1947-1948 A preliminary survey of Missouri archaeology. The Missouri Archaeologist 10(1-4).

1952 Cultural sequence of the lower Missouri valley. In Archeology of Eastern United States, edited by James B. Griffin, pp. 139-151. University of Chicago Press, Chicago.

1954 Preliminary salvage archaeology in the Pomme de Terre reservoir area, Missouri. The Missouri Archaeologist 16(3-4): 1-113.

1965 Preliminary archaeological investigations in the Kaysinger Bluff Reservoir area, Part II. Report to the National Park Service, University of Missouri-Columbia.

1975 The archaeology of Missouri, I. University of Missouri Press, Columbia.

1980 The archaeology of Missouri, II. University of Missouri Press, Columbia.

Chapman, Jefferson
1975 The Rose Island Site. University of Tennessee, Department of Anthropology, Reports of Investigations 14.

Chomko, Stephen A.
1976 The Phillips Spring Site, 23HI216: Harry S. Truman Reservoir, Missouri. Report to the Midwest Region of the National Park Service. Illinois State Museum Society.

Cleland, Charles E.
1976 The focal-diffuse model: an evolutionary perspective on the prehistoric cultural adaptations of the eastern United States. Midcontinental Journal of Archaeology 1(1): 59-76.

Clifton, James A.
1968 Cultural anthropology: aspirations and approaches. In Introduction to cultural anthropology, edited by James A. Clifton, pp. 2-47. Houghton-Mifflin, New York.

Cole, Fay-Cooper
1943 Chronology in the middle West. Proceedings of the American Philosophical Society 86(2): 299-302.

Cole, Fay-Cooper and Thorne Deuel
1937 Rediscovering Illinois. University of Chicago Press, Chicago.

Collins, Charles D., Andris A. Danielsons, and James A. Donohue
1977 The Downstream Stockton study: investigations at the Montgomery site, 23CE261. Report to the U. S. Army Corps of Engineers. American Archaeology Division, University of Missouri-Columbia.

Deuel, Thorne
1935 Basic cultures of the Mississippi valley. American Anthropologist 37(3): 429-446.

Falk, Carl R.
1969 Archaeological salvage in the Kaysinger Bluff Reservoir, Missouri: 1966. Report to the National Park Service. American Archaeology Division, University of Missouri-Columbia.

Falk, Carl R. and Kerry A. Lippincott
1974 Archaeological investigations in the Harry S. Truman Reservoir, Missouri: 1967-1968. Report to the National Park Service. American Archaeology Division, University of Missouri-Columbia.

Fenenga, Franklin
1938 Pottery types from Pulaski County. The Missouri Archaeologist 4(2): 5-7.

Flannery, Kent V.
1967 Culture history vs. cultural process: a debate in American archaeology. Scientific American 217(2): 119-122.

Fowke, Gerard
1910 Antiquities of central and southeastern Missouri. Bureau of American Ethnology Bulletin 37.

1922 Archaeological investigations. Bureau of American Ethnology Bulletin 76.

Funk, Robert E.
1978 Post-Pleistocene adaptations. In Handbook of North American Indians, Vol. 15, Northeast, edited by Bruce G. Trigger, pp. 16-27. Smithsonian Institution, Washington, D.C.

Gallaher, Art, Jr.
1961 Plainville fifteen years later. Columbia University Press, New York.

Gifford, Diane P.
1977 Observations of modern human settlements as an aid to archaeological interpretation. Unpublished Ph.D. dissertation, University of California-Berkeley. University Microfilms, Ann Arbor.

Graham, R. W.
1979 Archaeology and paleontology of the Kimmswick Clovis-mastodon site (abstract). Thirty-seventh Plains Conference: program and abstracts, p. 18. Kansas City, Missouri.

Griffin, James B.
1941 Report on pottery from the St. Louis area. The Missouri Archaeologist 7(2): 1-17.

1946 Cultural change and continuity in eastern United States. In Man in Northeastern North America, edited by Frederick Johnson, pp. 37-95. Papers of the Robert S. Peabody Foundation for Archaeology, Vol. III. Phillips Academy, Andover, Massachusetts.

1952 Culture periods in eastern United States archaeology. In Archeology of eastern United States, edited by James B. Griffin, pp. 352-364. University of Chicago Press, Chicago.

1964 The northeast woodlands area. In Prehistoric man in the New World, edited by Jesse D. Jennings, pp. 223-258. University of Chicago Press, Chicago.

1967 Eastern North American archaeology: a summary. Science 156(3772): 175-191.

Hassan, Fekri
1975 Determination of the size, density, and growth rate of hunting-gathering populations. In Population, ecology, and social evolution, edited by Steven Polgar, pp. 27-52. Mouton, The Hague.

Hoebel, E. Adamson
1946 The archaeology of Bone Cave, Miller County, Missouri. Anthropological Papers of the American Museum of Natural History 40(2): 139-157.

Hoffman, Michael P.
1969 Prehistoric developments in southwestern Arkansas. The Arkansas Archeologist 10(1-3): 36-49.

Iroquois Research Institute
1977 The cultural resources of Clinton Lake, Kansas: an inventory of archaeology, history, and architecture. Report to the U.S. Army, Corps of Engineers.

Jennings, Jesse D.
1968 Prehistory of North America. McGraw-Hill, NY.

Jochim, Michael A.
1967 Hunter-gatherer subsistence and settlement: a predictive model. Academic Press, New York.

Joyer, Janet E. and Donna C. Roper
1980 Archaic adaptations in the central Osage River basin: a preliminary assessment. In Archaic prehistory on the Prairie-Plains border, edited by Alfred E. Johnson, pp. 13-23. University of Kansas Publications in Anthropology 12.

Kay, Marvin
1978a Holocene adaptations within the lower Pomme de Terre Valley, Missouri. Report to the U.S. Army, Corps of Engineers. Illinois State Museum Society.

1978b Rodgers Shelter: an example of deep site sampling. In Holocene adaptations within the lower Pomme de Terre Valley, Missouri, edited by Marvin Kay, Chapter 4. Report to the U.S. Army Corps of Engineers. Illinois State Museum Society.

1978c Stratigraphic studies at Rodgers Shelter. In Holocene adaptations within the lower Pomme de Terre Valley, Missouri, edited by Marvin Kay, Chapter 5. Report to the U.S. Army Corps of Engineers. Illinois State Museum Society.

Keene, Arthur S.
1979 Economic organization models and the study of hunter-gatherer subsistence settlement systems. In Transformations, edited by Colin Renfrew and Kenneth L. Cooke, pp. 369-404. Academic Press, New York.

Kellar, Charles M.
1964 Preliminary archaeological reconnaissance and testing. In Preliminary archaeological investigations in Kaysinger Bluff Reservoir, Missouri edited by Carl H. Chapman. Report to the National Park Service. American Archaeology Division, University of Missouri-Columbia.

King, Frances B. and R. Bruce McMillan
1975 Plant remains from a Woodland storage pit, Boney Spring, Missouri. Plains Anthropologist 20(68): 111-115.

Koch, Albert C.
1857 Mastodon remains, in the State of Missouri, together with evidences of the existence of man contemporary with the mastodon. Transactions of the Academy of Science of St. Louis 1: 61-64.

Kramer, Carol, editor
1979 Ethnoarchaeology. Columbia University Press, New York.

Lakatos, Imre
1970 Falsification and the methodology of scientific research programmes. In Criticism and the growth of knowledge, edited by Imre Lakatos and Alan Musgrave, pp. 91-196. Cambridge University Press, Cambridge.

Lippincott, Kerry A.
1972 Archaeological investigations in the Kaysinger Bluff Reservoir, Missouri: 1969. Report to the National Park Service. American Archaeology Division, University of Missouri-Columbia.

McKern, William C.
1939 The midwestern taxonomic method as an aid to archaeological culture study. American Antiquity 4(4): 301-314.

McMillan, R. Bruce
1971 Biophysical change and cultural adaptation at Rodgers Shelter, Missouri. Unpublished Ph.D. dissertation, University of Colorado.

1965 A description of artifacts from the Kaysinger Bluff area surface survey. In Preliminary archaeological investigations in the Kaysinger Bluff Reservoir area, Part II, edited by Carl H. Chapman, pp. 223-262. Report to the National Park Service. University of Missouri-Columbia.

1976a The dynamics of cultural and environmental change at Rodgers Shelter, Missouri. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 211-232. Academic Press, New York.

1976b Man and mastodon: a review of Koch's 1840 Pomme de Terre expeditions. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 81-96. Academic Press, NY.

1976c Rodgers Shelter: a record of cultural and environmental change. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 111-122. Academic Press, New York.

MacNeish, Richard S.
1964 Ancient Mesoamerican civilization. Science 143(3606): 531-537.

Mack, John
1942 Archaeological field work at the University of Missouri. The Missouri Archaeologist 8(1): 19-20.

Martin, Paul S., George I. Quimby, and Donald Collier
1947 Indians before Columbus. University of Chicago Press, Chicago.

Montagu, M. F. Ashley and C. Bernard Peterson
1944 The earliest account of the association of human artifacts with fossil mammals in North America. Proceedings of the American Philosophical Society 87(5): 407-419.

Morse, Dan F.
1973 Dalton culture in northeast Arkansas. Florida Anthropologist 26(1): 23-38.

1975 Reply to Schiffer. In The Cache River archeological project, assembled by Michael B. Schiffer and John H. House, pp. 113-120. Arkansas Archeological Survey Research Series 8.

1977 Dalton settlement systems: reply to Schiffer (2). Plains Anthropologist 22(76, Pt. 1): 149-158.

Morwood, M. J.
1975 Analogy and the acceptance of theory in archaeology. American Antiquity 40(1): 111-116.

Newton, John P.
1977 Paleo-Indian in the Arkansas Ozarks: a preliminary statement. The Arkansas Archeologist 16-17-18: 85-92.

Nicholas, George Peter, II
1978 Variability in the Late Archaic: a lithic analysis. Unpublished M.A. thesis, University of Missouri-Columbia.

O'Brien, Patricia J.
1972 A Clovis point from the Waterville, Kansas area. Plains Anthropologist 17(55): 60-64.

Pangborn, Rolland E., H. Trawick Ward, and W. Raymond Wood
1971 Flycatcher Village: a non-pottery site in the Stockton Reservoir, Missouri. Plains Anthropologist 16(51): 60-73.

Piontkowski, Michael R.
1977 Preliminary archeological investigations at two Early Archaic sites: the Wolf Creek and Hand Sites. In Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. IX: Preliminary Studies of Early and Middle Archaic components, pp. 1-57. Report to the U.S. Army Corps of Engineers. American Archaeology Division, University of Missouri-Columbia.

Price, James E. and James J. Krakker
1975 Dalton occupation of the Ozark border. University of Missouri Museum of Anthropology Museum Briefs 20.

Purrington, Burton L.
1971 The prehistory of Delaware County, Oklahoma: cultural continuity on the western Ozark periphery. Unpublished Ph.D. dissertation, University of Wisconsin-Madison. University Microfilms, Ann Arbor.

Rafferty, Milton D.
1980 The Ozarks: land and life. University of Oklahoma Press, Norman.

Rathje, William L.
1979 Modern material culture studies. In Advances in Archaeological method and theory, Vol. 2, edited by Michael B. Schiffer, pp. 1-37. Academic Press, New York.

Reidhead, Van A.
1976 Optimization and food procurement at the prehistoric Leonard Haag Site, southeastern Indiana: a linear programming approach. Unpublished Ph.D. dissertation, Indiana University. University Microfilms, Ann Arbor.

1980 The economics of subsistence change: test of an optimization model. In Modeling change in prehistoric subsistence economies, edited by Timothy K. Earle and Andrew L. Christenson, pp. 141-186. Academic Press, New York.

Roper, Donna C.
1975a Archaeological survey and settlement pattern models in central Illinois. Unpublished Ph.D. dissertation, University of Missouri-Columbia.

1975b Cultural resources survey: Harry S. Truman Dam and Reservoir project: the archeological survey, Part I: Prior surveys, pp. 1-20. Report to the U.S. Army Corps of Engineers. American Archaeology Division, University of Missouri-Columbia.

1975c The Truman Reservoir survey: approach and preliminary results. Paper presented at the 33rd Plains Conference, Lincoln, Nebraska.

1977 Cultural resources survey: Harry S. Truman Dam and Reservoir project, Vol. IV: The archeological survey. Report to the U.S. Army Corps of Engineers. American Archaeology Division, University of Missouri-Columbia.

1978 Settlement-subsistence systems in the Truman Reservoir area. Paper presented at the 43rd Annual Meeting of the Society for American Archaeology, Tucson, Arizona.

1979a Archaeological survey and settlement pattern models in central Illinois. Midcontinental Journal of Archaeology Special Paper 2, Illinois State Museum Scientific Papers 16.

1979b The Woodland period in the Ozarks: the concept, its history, and its place in prehistory. Paper presented at the 37th Plains Conference, Kansas City, Missouri.

Roper, Donna C. and Michael R. Piontkowski
1979 Projectile points. Cultural resources survey: Harry S. Truman Dam and Reservoir project, Vol. V: Lithic and ceramic studies. Report to the U.S. Army Corps of Engineers. American Archaeology Division, University of Missouri-Columbia.

Roper, Donna C. and W. Raymond Wood
1975 Research design for the cultural resources survey, Harry S. Truman Dam and Reservoir project: the archeological survey. American Archaeology Division, University of Missouri-Columbia.

Rouse, Irving B.
1955 On the correlation of phases of culture. American Anthropologist 57(4): 713-722.

Saunders, Jeffrey J.
1977 Late Pleistocene vertebrates of the western Ozark Highland, Missouri. Illinois State Museum Reports of Investigations 33.

Schiffer, Michael B.
1975 An alternative to Morse's Dalton settlement pattern hypothesis. Plains Anthropologist 20(70): 253-266.

Scholtz, J. A.
1969 A summary of prehistory in northwest Arkansas. The Arkansas Archeologist 10(1-3): 51-60.

Sears, William H.
1948 What is the Archaic? American Antiquity 14: 122-124.

Smail, William
1951 Fluted points from Missouri. The Missouri Archaeologist 13(1): 18-20.

Smith, Bruce D.
1974 Middle Mississippi exploitation of animal populations: a predictive model. American Antiquity 39(2, Pt. I): 274-291.

1975 Middle Mississippi exploitation of animal populations. University of Michigan Museum of Anthropology Anthropological Papers 57.

Spier, Robert F. G.
1950 Index to The Missouri Archaeologist, Volumes 1 to 10, 1935 to 1948. The Missouri Archaeologist 12(2).

Stadler, Ernst A.
1972 Introduction. In Journey through a part of the United States of North America in the years 1844 to 1846, by Dr. Albert C. Koch, translated and edited by Ernst A. Stadler, pp. xvii-xxxv. Southern Illinois University Press, Carbondale and Edwardsville.

Stoltman, James B.
1978 Temporal models in prehistory: an example from eastern North America. Current Anthropology 19(4): 703-729.

Struever, Stuart
1968 Problems, methods, and organization: a disparity in the growth of archeology. In Anthropological archeology in the Americas, edited by Betty J. Meggers, pp. 131-151. Anthropological Society of Washington, Washington, D.C.

Synhorst, Curtis
1977 Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. I. Report to the U.S. Army Corps of Engineers, American Archaeology Division, University of Missouri-Columbia.

Thomas, Cyrus
1891 Catalog of prehistoric works east of the Rocky Mountains. Bureau of American Ethnology Bulletin 12.

Tuck, James A.
1974 Early Archaic horizons in eastern North America. Archaeology of Eastern North America 2(1): 72-80.

Vehik, Rain
1974 Archaeological investigations in the Harry S. Truman Reservoir area: 1970. Report to the National Park Service, American Archaeology Division, University of Missouri-Columbia.

1978 An analysis of cultural variability during the Late Woodland period in the Ozark Highland of southwest Missouri. Unpublished Ph.D. dissertation, University of Missouri-Columbia.

Watson, Patty Jo
1979 Archaeological ethnography in western Iran. Viking Fund Publications in Anthropology 57. Wenner-Gren Foundation for Anthropological Research, Inc. University of Arizona Press, Tucson.

Welch, L. M.
1972 Index to Missouri Archaeological Society publications. The Missouri Archaeologist 34(3-4).

West, James
1945 Plainville, U.S.A. Columbia University Press, New York.

Willey, Gordon R.
1966 An introduction to American archaeology, Vol. I: North and Middle America. Prentice-Hall, Englewood Cliffs, New Jersey.

Willey, Gordon R. and Philip Phillips
1958 Method and theory in American archaeology. University of Chicago Press, Chicago.

Willey, Gordon R. and Jeremy A. Sabloff
1974 A history of American archaeology. W. H. Freeman, San Francisco.

Winters, Howard D.
1969 The Riverton Culture. Illinois State Museum Reports of Investigations 13.

Wood, W. Raymond
1957 Five projectile points from western Missouri. Missouri Archaeological Society Newsletter 116: 10-11.

1961 The Pomme de Terre Reservoir in western Missouri prehistory. The Missouri Archaeologist 23:1-131.

1967 The Fristoe Burial Complex of southwestern Missouri. The Missouri Archaeologist 29: 1-128.

1968 Mississippian hunting and butchering patterns from the Vista Shelter, 23SR20, Missouri. American Antiquity 33(2): 170-179.

1976 Interdisciplinary studies in the Pomme de Terre River valley. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 3-11. Academic Press, New York.

Wood, W. Raymond and Donald L. Johnson
1978 A survey of disturbance processes in archaeological site formation. In Advances in archaeological method and theory, Vol. 1, edited by Michael B. Schiffer, pp. 315-381. Academic Press, New York.

Wood, W. Raymond and R. Bruce McMillan, editors
1976 Prehistoric man and his environments: a case study in the Ozark Highland. Academic Press, New York.

Wormington, H. M.
1957 Ancient man in North America. Denver Museum of Natural History Popular Series 4.

Yellen, John
1977 Archaeological approaches to the present. Academic Press, New York.

CHAPTER 2

THE BIOPHYSICAL ENVIRONMENT

by

Donna C. Roper

INTRODUCTION

The model of hunter-gatherer settlement systems and some previously postulated explanations of cultural stability rely heavily on the contents and structure of the biophysical environment. Table 2.1 lists those elements of the environment and the characteristics of those elements that are likely to be of greatest importance to a prehistoric population.

This chapter describes each of these elements and most characteristics, insofar as data are available. Inasmuch as several earlier contracts between the Corps of Engineers and the University of Missouri or the Illinois State Museum Society included environmental studies, and since the University of Missouri and Illinois State Museum personnel interacted on the studies of plant resources in particular, the descriptions of flora and fauna are largely summarized from these earlier studies, supplemented with other relevant information. Similarly, the present work included a detailed description of chert resources available to the Truman area inhabitants. This detailed description is presented in Vol. II, Pt. IV and therefore only a very general overview of chert resources is given in this chapter.

The baseline for these descriptions is the present or the recent past (proto-Euro-American in the case of floral data). The last decade and a half of research in the Truman Reservoir vicinity has demonstrated major environmental changes during the Holocene — changes that involve particularly the climate, plant, and animal resources. A brief outline of these changes therefore concludes the chapter.

Climate

The climate of the Truman Reservoir area is classified as Humid Continental (Rafferty 1980: 24, see also Moxom 1941: 953) with extremes in heat and cold and in drought and moisture. In general, the weather is described as variable (Rafferty 1980: 24) or changeable (Moxom 1941: 953).

TABLE 2.1

Elements and Characteristics of the Biophysical Environment

1. Climate

Temperature	Frost-free period
Precipitation	

2. Hydrography

Flooding	
Stream density and distribution	

3. Topography

General landforms	View
Shelter and protection	Barriers

4. Soils

Fertility-yields	Runoff
Availability-areas	Soil slope
Permeability	

5. Mineral resources

Chert	Clays
Hematite and galena	

6. Plant resources

Forest composition	Distribution (seasonal, spatial)
Yields	Fuel potentials
Zonation	

7. Animal resources

Species available	Habitats
Densities	Habits

Descriptive summaries for the Warsaw weather station show January to be the coldest month with a 60 year (1901-1960) average of 33.3° F. (0.7° C.) and July to be the warmest month with a 60 year average of 79.4° F. (26.3° C.) (U. S. Department of Commerce 1965: 57). Mean monthly, mean daily maximum, and mean daily minimum temperatures are graphed in Figure 2.1. A 40 year record (1901-1940) shows average last killing frost in the spring to occur on April 21, and first killing frost in the fall to occur on October 15, for an average frost-free growing season of 177 days (Moxom 1941: 945).

Precipitation is lowest during the winter months (DJF), with a 67 year mean of 2.08 inches (5.1 cm) in January. Average monthly precipitation then increases to a peak of 5.51 inches (14.0 cm) in June, drops off, rises to a secondary peak in September, then steadily declines for the remainder of the fall (Fig. 2.2). Expectably, snowfall is greatest in January and February (Fig. 2.2), with an average of 5.3 inches (13.5 cm) in each month (U.S. Department of Commerce 1965: 36).

Hydrography

A flood, far from being an unexpected, catastrophic event, is a normal and expectable characteristic of a stream (although still sometimes catastrophic). Rivers cannot form channels that could handle any magnitude of flow. Consequently, when a river is called upon to carry a discharge larger than usual, it cannot contain it within its channel and overflows (Leopold 1974: 72-73). Flooding, an event that commonly occurs, would render the stream's floodplain uninhabitable at least until the discharge was reduced to one that could be contained within the river's banks. For this reason, it is worth examining flooding patterns in a region.

Hydrologists treat the variation in magnitude of a year's largest flow event (the annual flood) as a random variable and study it as a probability problem. Assuming that the floods occurring during any given period of time are a sample of an indefinitely large population of floods, annual floods may be described in terms of probability distributions (Leopold 1974: 73) and the probability of an annual flood taking place during a given month or season can be calculated.

Flood records for Missouri streams are available (Sandhaus and Skelton 1968). From these, the annual floods for periods of record have been tabulated for five stations in or near Truman Reservoir: the Sac River at Stockton (45 year record), the Osage River at Osceola (49 year record), the Pomme de Terre River at Hermitage (44 year record), the

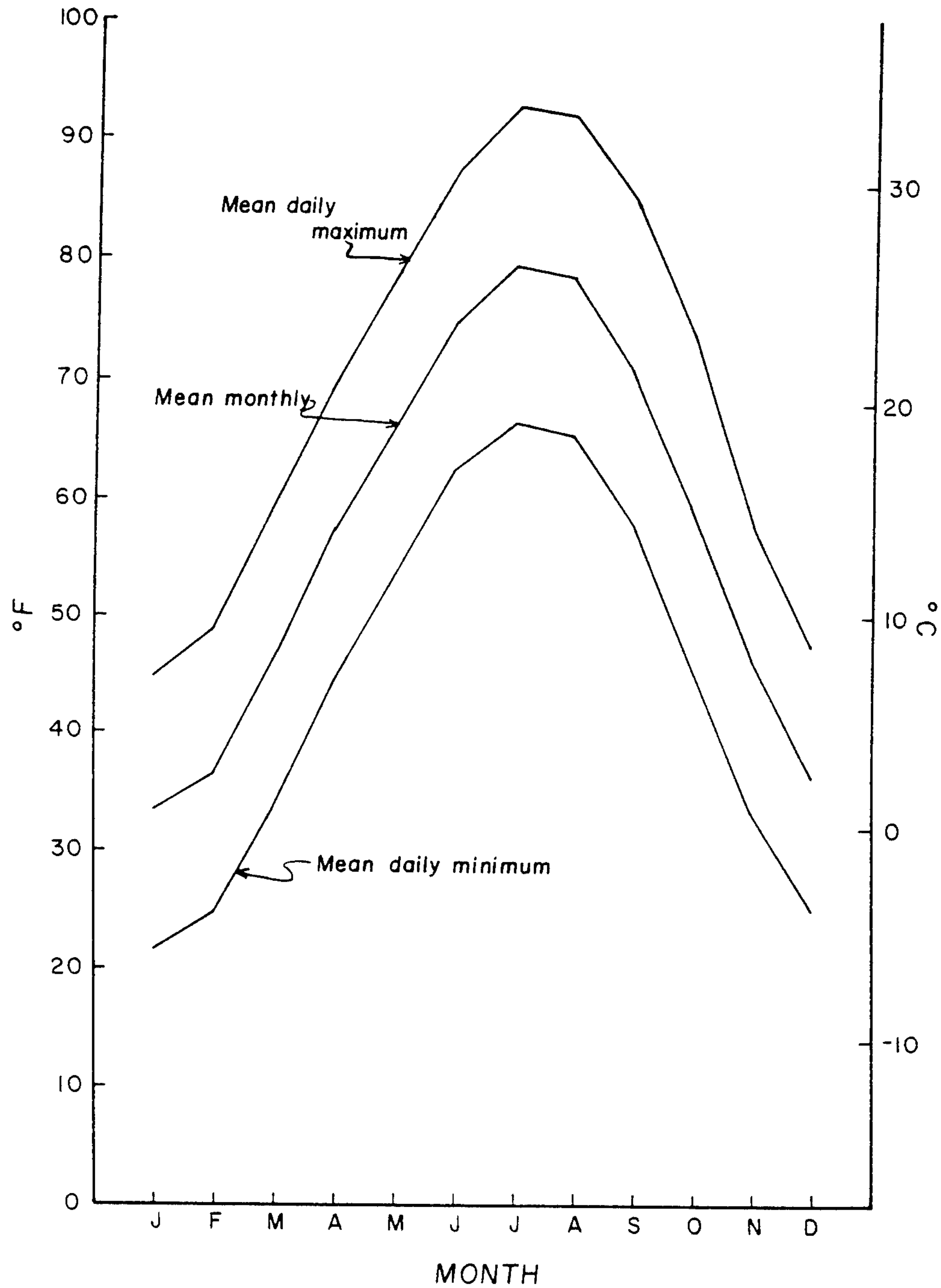


Figure 2.1. Monthly temperatures at the Warsaw Weather Station (data from U.S. Department of Commerce 1965).

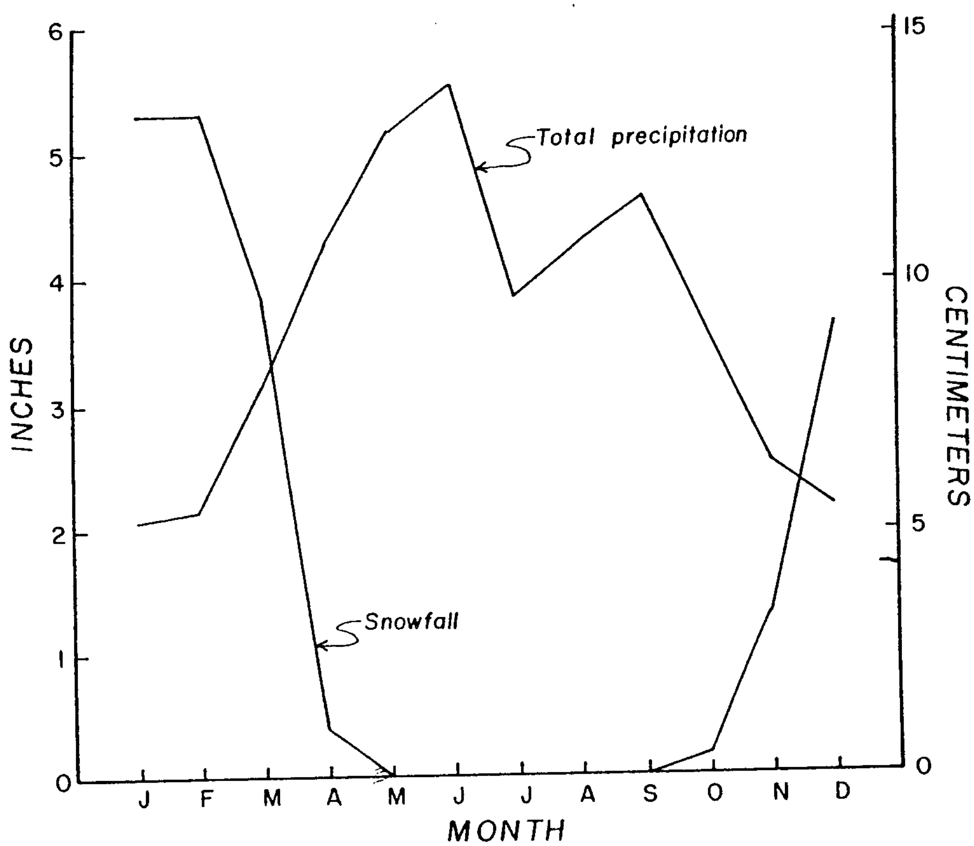


Figure 2.2. Monthly precipitation at the Warsaw Weather Station (data from U.S. Department of Commerce 1965).

South Grand River near Brownington (44 year record), and the Osage River at Warsaw for those years prior to regulation by Bagnell Dam (24 years). With frequencies converted to proportions to ensure comparability, the occurrence of the annual flood is plotted, by month, for each of these five stations (Fig. 2.3). It is clear that the annual flood is most likely to occur in one of the spring months.

A further useful relationship is the recurrence interval, i.e., the average interval within which a flood of a given magnitude will be equalled or exceeded once (Leopold, Wolman, and Miller 1964: 65-66) and its reciprocal, which is the probability of occurrence of a flood of a given magnitude in a given year. Calculations of recurrence intervals are given for some stations by Sandhaus and Skelton (1968: 266). They were roughly translated to heights (in feet) above mean sea level and tabulated by Roper (1977: 207) for three stations. This table is repeated below (Table 2.2).

It would be a simple matter to work from these data to calculate the flood risk for any site for a given month or season (or simply in any given year) as has been done by Roper (1979: 78-80) and Christenson, Klippel, and Weedman (1975: 46-48) both in the Sangamon River valley of central Illinois. In the case of the Osage River Basin, however, such calculations would probably be misleading. As is shown by Haynes (1976) and Brakenridge (n.d.), rivers have been actively aggrading their floodplains and then downcutting during the entire period of human occupation of the western Ozarks. Calculations of flood risk would thus be meaningless. However, the above figures are still instructive for, if anything, they should underrepresent the recurrence interval and therefore flood risks attending the occupation of a site at a given elevation.

Availability of a source of water is always important to a human population. Not all water sources are, however, alike in terms of their navigability, the species of fish, mussels, and turtles they support, and their permanence. Some means of describing the kinds of watersources present and their variability is needed. No reliable system exists that can evaluate watersources for properties that are of interest to the archeologist (such as yields of fish, etc.). However, increasingly used by archeologists is the system of stream ranking commonly used by geomorphologists and introduced into the archeological literature by Weide and Weide (1973). In this system, a stream with no tributaries is designated as a first order stream. When two first order streams join, a second order stream is created; two second order streams join to form a third order stream, etc. (Fig. 2.4). When streams of unequal rank join, the lower order stream is considered to terminate and to flow into the higher

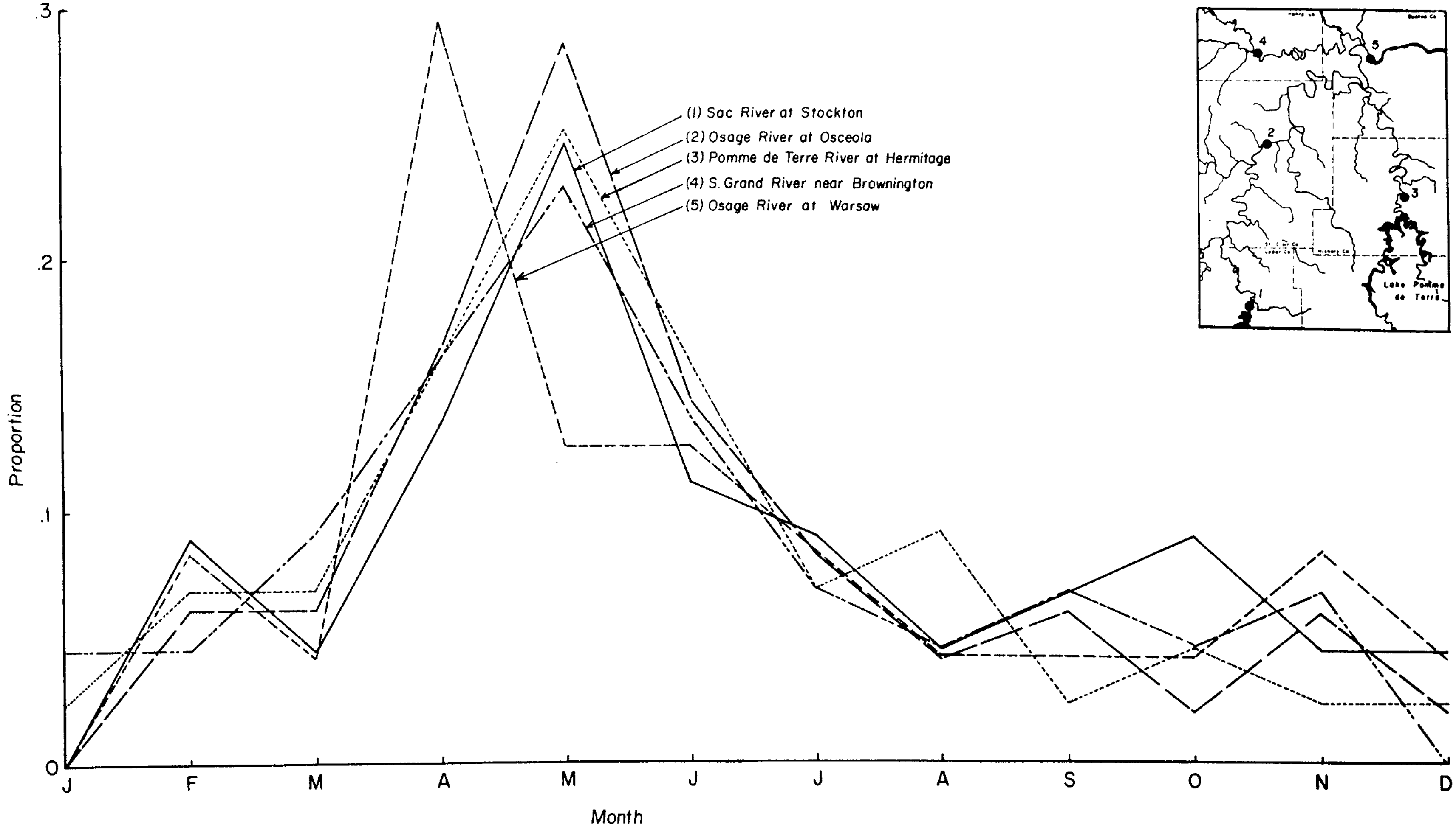


Figure 2.3. Occurrence of the annual flood at 5 stations (data from Sandhaus and Skelton 1968).

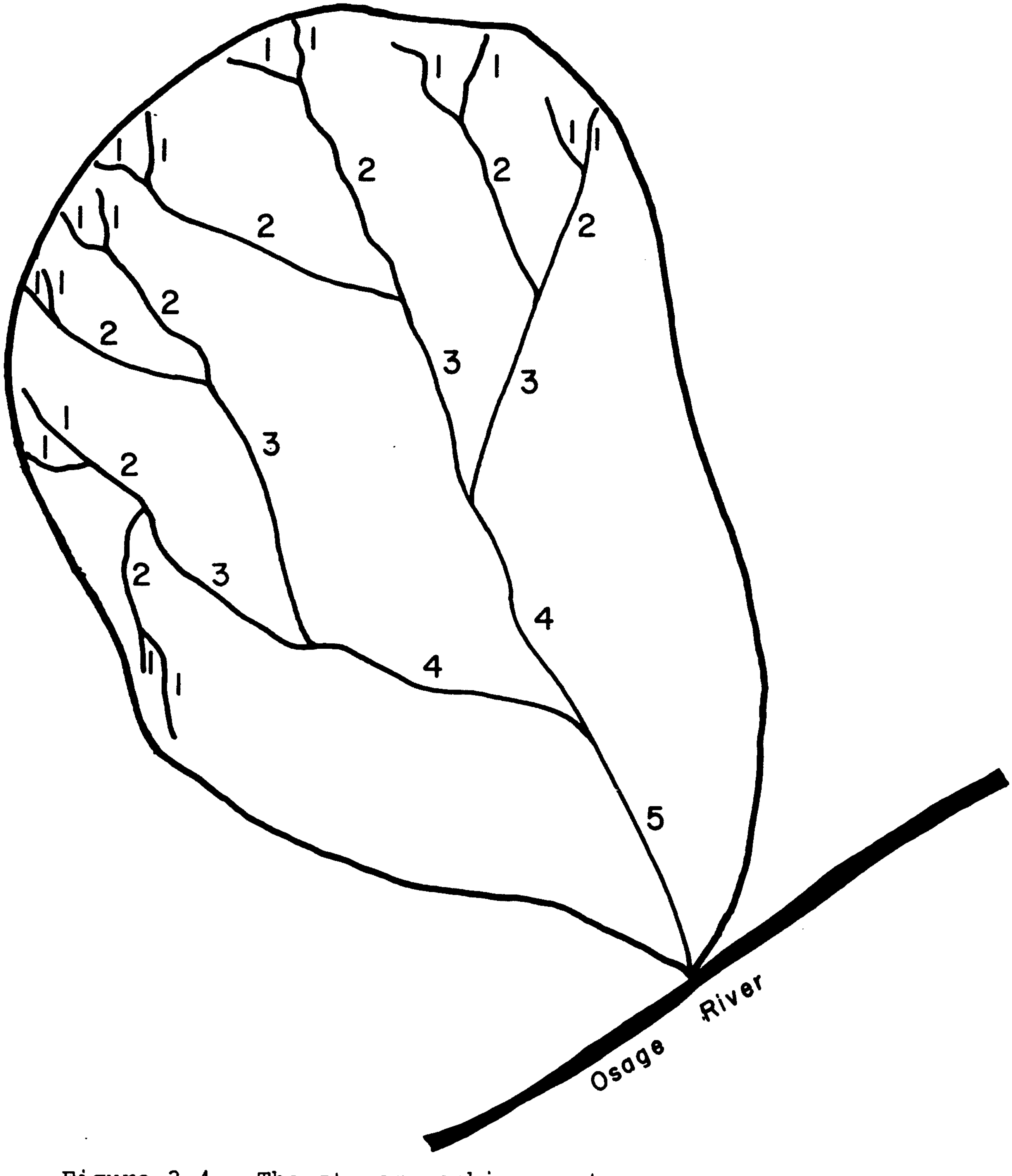


Figure 2.4. The stream ranking system.

TABLE 2.2

Heights (AMSL) of the Annual Flood
(from Roper 1977: 207)

		STATION		
		Osage River at Osceola	Pomme de Terre River at Hermitage	South Grand River near Brownington
Recurrence interval (in years)	1.2	695.2	742.7	692.5
	2.33	703.7	750.5	701.6
	5	709.5	754.0	706.6
	10	712.1	757.1	710.7
	25	714.5	760.3	714.0
	50	717.5	763.1	716.2
Approximate height of river bank		690	740	690

order stream; only when two streams of equal rank join is a stream of higher order created. Ranking is dependent upon the scale of the map on which it is performed. In the Truman Reservoir, U.S.G.S. 7.5' quadrangles were used. Since the Osage River rises in a part of Kansas for which 7.5' quadrangles are not available and since it would be necessary to rank the entire Osage Basin as far as Truman Dam, only the streams in the immediate Truman vicinity are ranked. It was therefore not possible to derive values for the Pomme de Terre, Sac, Osage, or South Grand Rivers. The Pomme de Terre and Sac rivers have therefore been assigned a value of 9, the South Grand and Osage rivers a value of 10. These values cannot be used quantitatively but are useful for description. With ranking finished, a map of some of the larger watercourses in the reservoir area is shown in Fig. 2.5.

Some estimate of density of watersources would also be useful but cannot be easily derived. Technically, it would be possible to derive a density by figuring all channel lengths, summing them, and dividing by basin area (Ruhe 1975: 91; Weide and Weide 1973: 430); however, this would probably not be possible because the Osage rises in an unmapped part of Kansas. If it could be done, we could also calculate stream frequencies and bifurcation ratios (Ruhe 1975: 92) permitting an estimate of how well streams of varying orders (and probably resource potential) are distributed in the study area. In the absence of the means for making these measures (and the geomorphic confidence for making them with some assurance of their validity) we substitute an archeologist's observations.

The Stage 2 survey of the Truman Reservoir used a stratified set of randomly selected transects that crossed major streams, but ran from land acquisition boundary to land acquisition boundary. They went generally perpendicular to the major stream defining the stratum but could potentially go across, along, or at an angle to any other stream in an area. This survey recorded 476 sites, of which 82.4% were within .1 mi of water, and 96.2% were within .2 mi of water (Roper 1977: 193). This could, of course, be the result of cultural preference for location near water, but the experience of plotting sites on maps to collect such data leaves the strong impression that it would be very difficult to find a location for a site that was <u>not</u> within a small fraction of a mile from water.

Physiography

The Truman Reservoir straddles the border between two major physiographic provinces of North America – the Ozark Plateau (or Ozark Highland) and the Osage Plains (or Cherokee Plains) of the Central Lowland (Hunt 1974: 326-327;

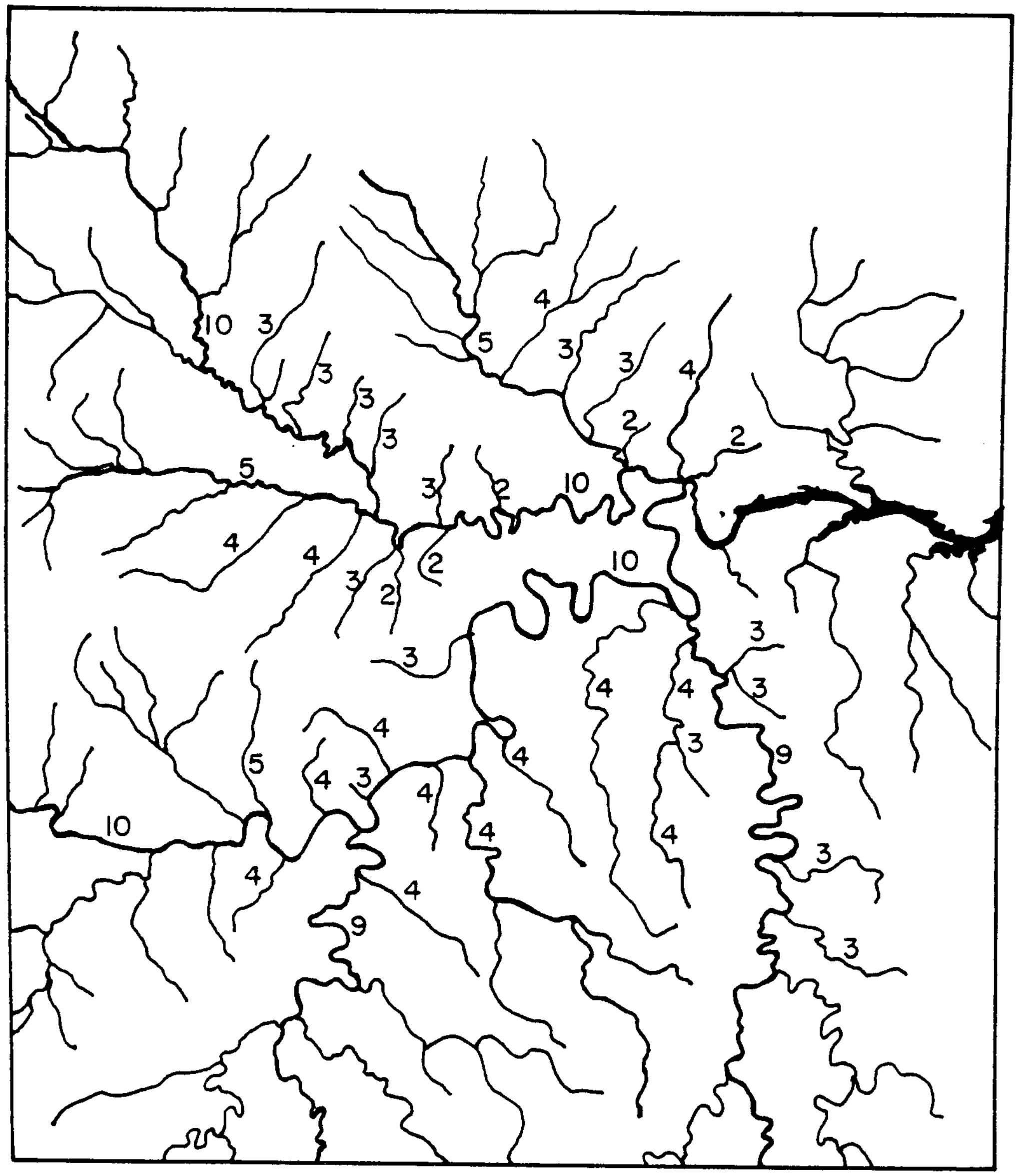


Figure 2.5. Distribution of major stream ranks.

see also Ward and Thompson 1977). The Ozark portion is within the region of the Springfield Plain and the Central or Salem Plateau (Fig. 2.6; Rafferty 1980: 13-14; Bretz 1965: 11-12).

This statement is not made without some difficulty, for the western border of the Ozark Highland is the least readily definable:

> No striking changes in land-form features distinguish the Ozarks from territory to the west, but instead there is a gradual transition from forested hills to level, cultivated fields (Rafferty 1980: 3).

Thus, although Rafferty and others (Fenneman 1938, Hunt 1974) include the Springfield Plain within the Ozarks, others (Branson 1944: 350-351; Collier 1955; Bretz 1965: 95) do not consider it to be within the Ozarks. It is probably for this reason that Chapman's map of the archeological-physiographic regions of Missouri (Chapman 1975: 3) would place the Truman Reservoir almost entirely within the Western Prairie Region. Bedrock and soils descriptions will make it clear that a portion of Truman Reservoir falls within the Ozark Highland (Salem Plateau), a portion of it truly falls within the Western Prairie (Osage Plains), and a portion of it lies in that area (Springfield Plain) that is best characterized simply as transitional – an area in which the river valleys retain Ozark characteristics, while the uplands take on characteristics of the prairie.

The Salem Plateau segment of the reservoir is restricted to the vicinity of the Pomme de Terre River and the lower segment of the Osage. Bedrock is Ordovician in age, comprised primarily of the Jefferson City dolomite, a thick (60-75 m; Ward and Thompson 1977: 8) formation that contains abundant high-quality chert. Ridge tops contain scattered monadnocks of younger Mississippian age formation limestone. Relief in this part of the reservoir may be up to 100 m or more and may contain steep, often nearly vertical bluffs along the major rivers. Rockshelters of varying sizes are common along the bluffs of streams of all sizes. Loess deposits are thin at best (in the zone listed as 2 1/2 - 5 feet by Scrivner et al. [1975: 7]); loess has been entirely stripped in some places. This is true throughout the reservoir area.

Salem Plateau streams, such as the Pomme de Terre River, are deeply entrenched, flowing in narrow valleys, describing tortously meandering courses. Springs occur (Vineyard and Feder 1974), although they are not as abundant as they are farther into the Ozarks, and do not have as high a discharge as some of the more prominent Ozark springs.

FIGURE NOT AVAILABLE

Figure 2.6. Physiographic regions of Truman Reservoir.

The Salem Plateau and Springfield Plain meet at the Eureka Springs Escarpment (sometimes called the Burlington Escarpment), the abutment of the Ordovician and Mississippian formations (Fig. 2.7). Within the Springfield Plain, bedrock consists primarily of Mississippian age formations (Ward and Thompson 1977: 2; Anderson 1979), particularly the Chouteau and Burlington limestones, both of which contain abundant cherts. Ordovician age deposits, however, still form the lower part of the valley walls. Relief is somewhat less than on the Salem Plateau and the uplands are gentler (Ward and Thompson 1977: 2). Rockshelters are still abundant on the lower slopes along all sizes of streams. The stream valleys retain the characteristics of Ozark streams on the Salem Plateau, that is, they describe a meandering course through deeply entrenched, narrow valleys.

To the northwest of the Springfield Plain lie the Osage Plains. Bedrock here consists of Pennsylvanian age sandstone and shale, with Burlington limestone forming the lower portion of the valley walls in parts near the Springfield Plain (Fig. 2.7) (Anderson 1979). Except for where the Burlington formation outcrops, cherts are not locally available in the bedrock. Rockshelters are also absent in this area. Relief is considerably less than it is to the east, and the landscape is far more gently rolling.

Stream valleys are considerably broader in the prairies than they are on either the Springfield or Salem Plateaus. Grogger and Persinger (1976: 69) note that in Henry County

> The flood plains of Big Creek, South Grand River, and Deepwater Creek are 1 to 2 miles wide and are of low gradient. The flood plain of the South Grand River narrows to less than one-fourth mile just below the junction with Deepwater Creek.

Similarly, the Osage River valley narrows dramatically near the Vernon County-St. Clair County line.

The bottoms of the major stream valleys contain an extensive system of Pleistocene and Holocene alluvial terraces that have been mapped in detail in the Breshear's Bottoms area of the Pomme de Terre River (Haynes 1976, 1977 this report, Vol.III; Brakenridge n.d.); but are known to be generalizable to the Osage, South Grand, and Sac rivers as well as to some of their larger tributaries. Briefly, the Pomme de Terre and other river valleys contain three Pleistocene terraces (designated T-3, T-2, and T-1a), the most recent of which (T-1a) has yielded a terminal date of 13,550±400 years ago (Haynes 1976: 56). The extensive Holocene terrace – the so-called Rodgers Terrace or Rodgers Alluvium (T-1b) – began to form about 11,000 years ago and was abandoned less than 1000 years ago (Haynes 1976: 59).

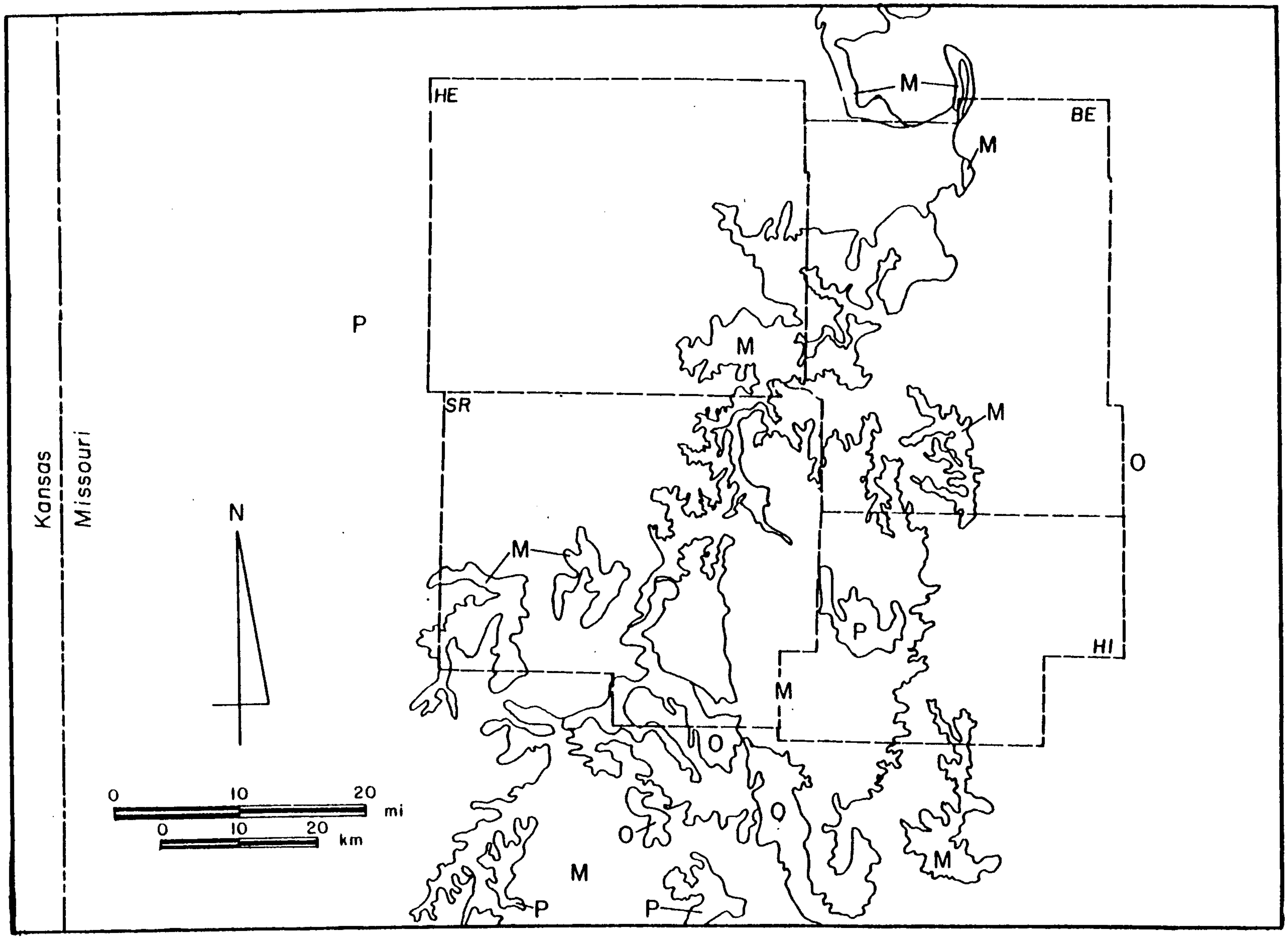


Figure 2.7. Major geologic formations in the Truman Reservoir area.

Its type locality is Rodgers Shelter where it contains a long cultural record throughout the deposits. Its presence has major implications for the discovery of archeological sites; implications that are further explored in the surface and subsurface survey reports in this report. Its depositional history is sufficiently well known that its environmental implications are also of use in interpretation of the Archaic sequence in particular. Following the abandonment of the Rodgers Terrace, a new floodplain began aggrading – the modern T-0. This unit was abandoned only in the late 1970's with the filling of Truman Reservoir.

Soils

If the archeologist had to choose one single set of variables or one type of map to which to relate archeological sites, it would probably most often be a soils map. Soil is a product of several factors, including climate, organisms, topography, parent material, and time (Ruhe 1975: 36). Detailed soils maps, such as are produced in modern soil surveys, contain information allowing inference of slope, texture, fertility, vegetation under which formed, drainage, flooding risk, and other information of potential interest to the archeologist (see, e.g., U.S.D.A.-S.C.S. et al. 1980 for examples of the kinds of data derivable from soils maps). Because of the utility of soils maps and descriptions, their lack in a particular study area is frustrating. Of the four counties in the Truman area, a modern soil survey has been published only for Henry County (Grogger and Persinger 1976). For overall reservoir study, therefore, only general soil association maps are available. Of these latter, there are two such maps available: that by Scrivner, Baker, and Miller (1966) and the more recent general soil map by Allgood and Persinger (1979). Each has virtues and drawbacks for describing an area. Both are therefore discussed.

The General Soil Map: Missouri (Allgood and Persinger 1979) very clearly reflects the three major physiographic divisions of Salem Plateau, Springfield Plain, and Osage Plains, referring to them respectively as Ozarks, Ozark Border, and Cherokee Prairies (Fig. 2.8). It maps and describes each of the soil associations within each region.

The soils in the Ozark uplands are those of the Lebanon-Goss-Bardley-Peridge association, described as "well drained and moderately well drained, loamy, clayey and cherty, deep and moderately deep soils and soils with fragipans on gently sloping to very steep uplands" (Allgood and Persinger 1979: 34). These are alfisols (mature forest soils) formed over loess and limestone or cherty limestone (Allgood and Persinger 1979: 54).

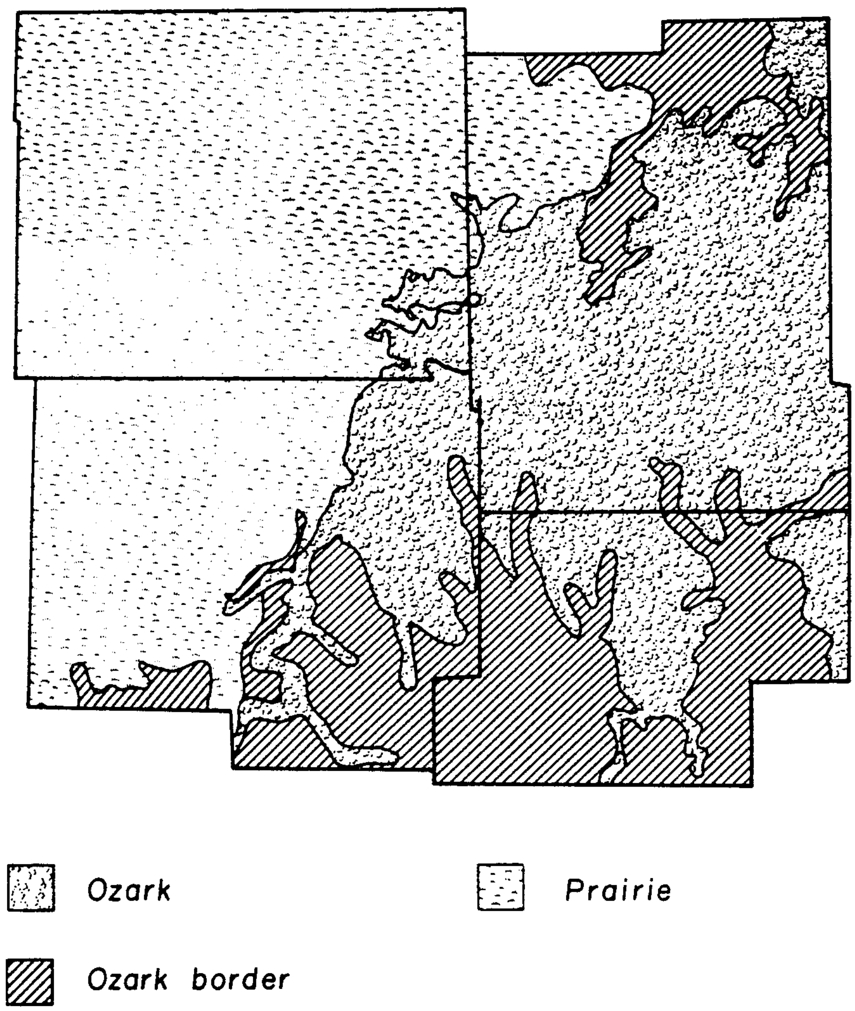


Figure 2.8. Major soil associations in the
Truman Reservoir area.

Bottomland soils in this area are mapped as the Hartville-Ashton-Cedargap-Nolin association, described as "deep, nearly level to gently sloping, somewhat poorly drained, loamy, bottomland soils" (Allgood and Persinger (1979: 39). All are formed over alluvium (ibid.: 56). More detailed studies of these soils have been completed by Johnson and his associates (1977, this report Vol. III).

Ozark border soils in the uplands are the Peridge-Wilderness-Goss-Pembroke association or less often, the Gerald-Creldon-Hoberg-Keeno association. The former are described as "deep, nearly level to very steep, well drained and moderately well drained loamy and cherty upland soils"; the latter as "moderately well drained and somewhat poorly drained, loamy and clayey, gently sloping to strongly sloping upland soils that have fragipans" (Allgood and Persinger 1979: 32, 30). Both associations are comprised of alfisols with silty surface texture and silty to silty clay loam subsoils. They are formed over loess and/or cherty limestone (Allgood and Persinger 1979: 54). Bottoms in this area have the same Ozark Hartville-Ashton-Cedargap-Nolin association as described on the Salem Plateau.

The predominant upland soil associations in the prairies are the Haig-Hartwell-Deepwater and Newtonia-Summit-Barco-Snead along the South Grand River and Deepwater Creek in Henry County and northern St. Clair County and the Bolivar-Hector association along the Osage River in St. Clair County. The first of these is described as "deep, nearly level to strongly sloping, poorly drained to moderately well drained clayey and loamy, upland soils"; the second as "deep and moderately deep, nearly level to moderately steep, well drained and moderately well drained, clayey and loamy upland soils"; the third as "deep and shallow, gently sloping to very steep, well drained, loamy, upland soils" (Allgood and Persinger 1979: 27-28). The northern two associations are primarily mollisols, formed over loess and shale on areas of gentle slope; the St. Clair County soils are alfisols and inceptisols that are formed over sandstone and shale (Allgood and Persinger 1979: 53). The bottoms in these areas are covered by the Hepler-Radley-Verdigris-Osage association of "deep, nearly level to gently sloping, moderately well drained to poorly drained, loamy and clayey bottomland soils" (Allgood and Persinger 1979: 29).

In order to help summarize and visualize the spatial variability in Truman Reservoir soils, their salient characteristics are tabulated in Table 2.3. As a group, the soils of the Western Prairie are more variable in texture than Ozark or Ozark Border soils although overall, soils with a loam surface and silty clay loam subsoil are the most common. Drainage tends to be slightly better in the Ozark and Ozark Border soils than in the prairies.

Unfortunately, a few other characteristics of soils, such as land use capability and fertility are not treated in the general soil association descriptions. Some information, again at a general scale, is available in the older classification of Soils of Missouri (Scrivner, Baker and Miller 1966). The major soil areas delineated in that classification that apply to Truman Reservoir are shown in Fig. 2.9. Again, the Ozark, Ozark Border, and prairie divivions are readily delimited within the reservoir. The Ozarks is represented by the Clarksville-Fullerton-Talbot (CF) and Lebanon-Nixa-Clarksville and Hobson-Clarksville (LC) associations occurring respectively in the Osage and Pomme de Terre basins; the Ozark border by the Gerald-Craig-Eldon and Newtonia-Baxter association (GC) in the general upland and plateau areas, and by the Bolivar-Mandeville association (B) in the Osage River valley; the prairies are represented by the Parsons-Dennis-Bates association (PD). All of these pertain solely to the uplands, bottomland alluvial soil associations are not given, the best we can do is list values for some that are likely to be relevant, according to other available information. Various characteristics of soils relevant to the Truman area are given in Table 2.4.

This table is somewhat more instructive than is Table 2.3. Only in the prairies and the high uplands (essentially the major interfluves) in the transition are the upland soils of even medium fertility. The Osage valley and Ozarks upland soils are, even today, used mostly for pasture or are still in forest. Bottomland soils, with the apparent exception of some terrace soils, are considerably more fertile and have a higher land use capability.

Mineral Resources

Aboriginally, the most important mineral in the Ozarks was chert. As noted in the description of physiography, a variety of high quality cherts are abundantly available throughout most of the area. Local cherts, available as *in situ* nodules and residuum, are available in both the Ordovician age Jefferson City formation and the Mississippian age Chouteau and Burlington formations. All these cherts, as well as other cherts occurring upstream are additionally available in stream beds. Other Ordovician cherts outcrop to the east of Truman, and still others were available via either trade or procurement trips. The varieties and availability of chert in the Truman Reservoir and immediately surrounding area is examined in detail by Ray (Vol. II, Pt. IV) and is not further considered here.

Also of considerable aboriginal importance is clay. Terraces along all major rivers provide abundant clays suitable for manufacture of ceramic vessels, although they vary

TABLE 2.3

Summary of Soil Characteristics, Truman Reservoir Area

Soil Series	Assoc. # on U.S.D.A. Map	Physiographic Area	Landform	Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14
					Surface Texture													
Haig	47	Cherokee Prairies	Upland	Mollisol								X						
Hartwell	47			Mollisol								X						
Deepwater	47			Mollisol								X						
Newtonia	48			Mollisol								X						
Summit	48			Mollisol								X						
Barco	48			Alfisol									X					
Snead	48			Mollisol				X										
Liberal	49			Alfisol								X						
Barco	49			Alfisol									X					
Collinsville	49			Mollisol											X			
Bolivar	50			Alfisol											X			
Hector	50			Inceptisol											X			
Hepler	51		Bottoms	Alfisol								X						
Radley	51			Mollisol								X						
Verdigris	51			Mollisol								X						
Osage	51			Mollisol		X												
Peridge	56	Ozark Border	Upland	Alfisol								X						
Wilderness	56			Alfisol								X+						
Goss	56			Alfisol								X+						
Pembroke	56			Alfisol								X						
Gerald	53			Alfisol								X						
Creldon	53			Alfisol								X						
Hoberg	53			Alfisol								X						
Keeno	53			Alfisol								X+						
Lebanon	59	Ozarks		Alfisol								X						
Goss	59	Ozarks		Alfisol								X+						
Bardley	59	Ozarks		Alfisol								X+						
Peridge	59	Ozarks		Alfisol								X						
Hartville	72	Ozarks	Bottoms	Alfisol								X						
Ashton	72	Ozarks		Alfisol								X						
Cedargap	72	Ozarks		Mollisol								X+						
Nolin	72	Ozarks		Inceptisol								X						

+Cherty

*In county, but not Harry S. Truman fee lands

Subsurface Texture 1	2	3	4	5	6	7	8	9	10	11	12	13	14	Drainage 1	2	3	4	5	6	7	Slope: Level	Nearly level	Gentle slope	Sloping	Medium steep	Steep	Very steep	% of Land in County: Hickory	Benton	St. Clair	Henry
			X												X						—	—									
X																X					—	—	—					0.0	12.6*	24.4	47.9
			X														X					—	—								
			X															X			—	—	—								
	X																X				—	—	—	—				0.0	0.6	0.0	33.3
								X										X				—	—	—	—						
	X																X						—	—	—	—					
			X														X					—	—	—	—						
								X										X				—	—	—				0.0	0.0	3.7	0.0
										X								X				—	—	—	—						
				X														X				—	—	—				0.0	0.0	15.9	0.0
										X								X				—	—	—	—	—	—				
			X													X					—										
							X										X				—							0.0	0.2	7.3	14.3
							X								X						—										
	X														X						—										
							X											X			—	—	—	—							
			X$^+$														X					—	—	—				32.4	0.0	20.9	0.0
			X$^+$															X				—	—	—	—	—	—				
			X															X				—	—	—							
	X															X						—	—								
			X														X				—	—	—					30.9	18.2	3.0	0.0
			X														X					—	—								
			X$^+$														X				—	—	—	—							
	X																X				—	—	—								
	X																	X			—	—	—	—	—	—	—	26.3	52.8	13.8	4.1
	X																	X			—	—	—	—	—	—					
			X															X			—	—	—	—	—						
			X													X					—	—	—								
							X											X			—	—	—					10.4	15.5	10.2	0.3
							X$^+$											X			—	—									
							X											X			—	—									
																											Others	0.0	0.0	0.8*	0.8

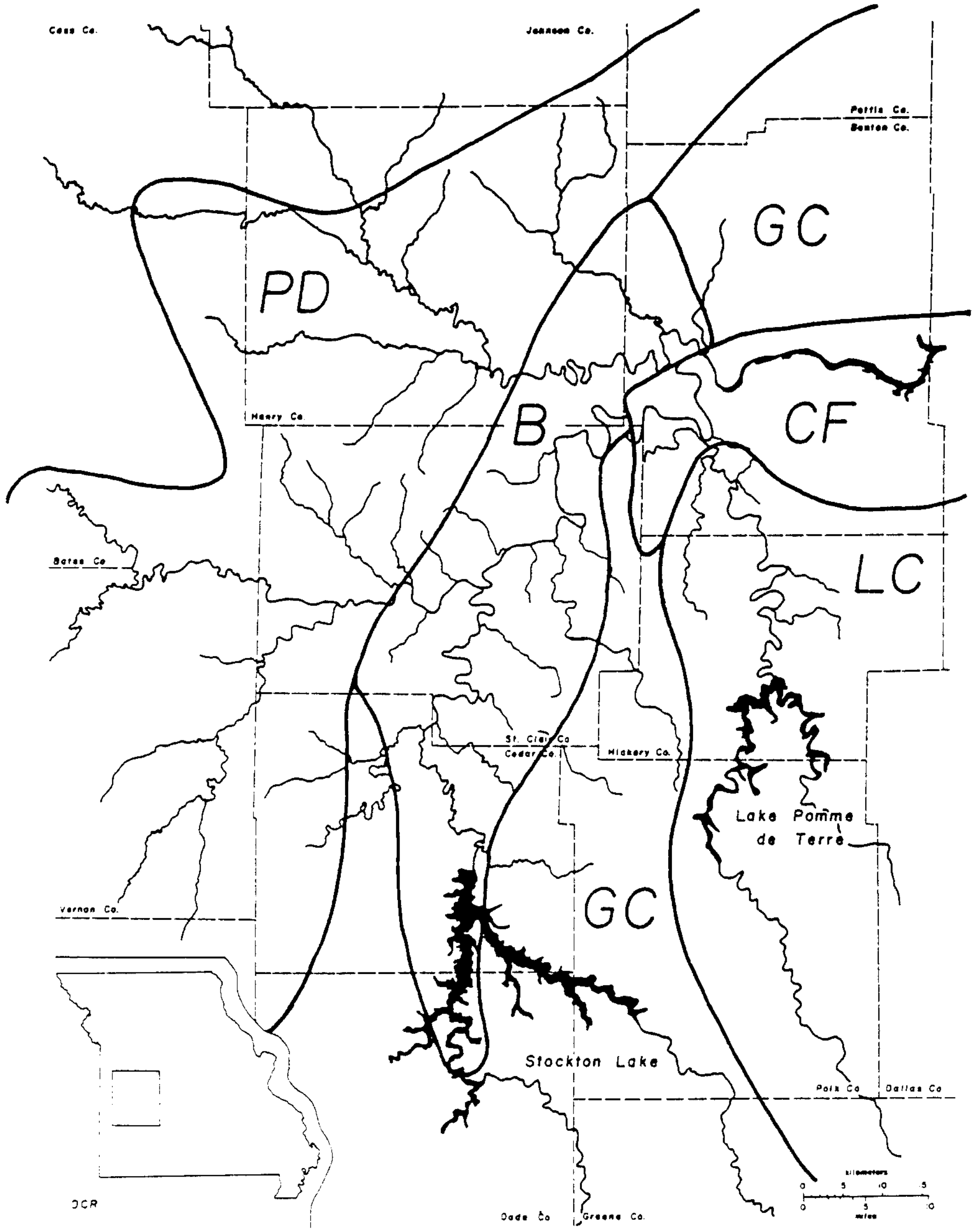


Figure 2.9. Major soil areas in the Truman Reservoir vicinity.

TABLE 2.4

Characteristics of Truman Reservoir Soils
(from Scrivner, et al. 1975: 32-47)

Soil Series	Assoc. Letter On Map	Landform	Slope and Topography	Present Dominant Land Use	Capability Class	Inherent Fertility
Parsons	PD	Upland	Nearly level	Crops	3 and 4	Medium
Dennis	PD	Upland	Gently rolling	Crops	3	Medium
Bates	PD	Upland	Gently rolling	Crops & pasture	4	Medium
Gerald	GC	Upland	Nearly level	Crops	4	Medium
Craig	GC	Upland	Gently rolling	Crops	3	Medium
Eldon	GC	Upland	Gently rolling to rolling	Pasture and crops	4 and 6	Medium
Newtonia	GC	Upland	Gently rolling	Crops	2	High
Baxter	GC	Upland	Gently rolling to hilly	Pasture & crops	4 and 6	Very low
Bolivar	B	Upland	Gently rolling	Pasture & crops	4 and 6	Very low
Mandeville	B	Upland	Rolling	Pasture & forest	4 and 6	Low
Clarksville	CF, LC	Upland	Hilly	Forest	7	Very low
Fullerton	CF	Upland	Rolling to hilly	Forest & pasture	5 - 7	Low
Talbot	CF	Upland	Hilly	Forest	4-7	Low
Lebanon	LC	Upland	Nearly level	Pasture & crops	4 and 6	Very low
Nixa	LC	Upland	Gently rolling	Crops & pasture	5	Low
Hobson	LC	Upland	Nearly level	Forest & pasture	4-6	Very low
Verdigris	pr.	Bottoms	(FP)	Crops	2	Medium
Osage	pr.	Bottoms	(FP)	Crops	2 and 4	High
Huntington	OZ	Bottoms	(FP)	Crops	2	High
Lindside	OZ	Bottoms	(FP)	Crops	3	Medium
Dunning	OZ	Bottoms	(FP)	Pasture & crops	3	High
Robertsville	OZ	Bottoms	(Terrace)	Crops	4	Low

in desirability for pottery making. The various clays and their suitability for ceramic manufacture are discussed by Tippitt (Vol. II, Pt. 2).

Two other minerals used in the area are hematite (and its close associate, limonite) and galena. Both are locally available.

Hematite and limonite are both oxides of iron (Fe_2O_3 and $Fe_2O_3 \cdot n\ H_2O$) (Keller 1961: 56-58) and are abundant and important mineral resources of the Missouri Ozarks. The Iron County-Iron Mountain area in the eastern Ozarks is the major producer of hematite and other iron ore (Keller 1961: 56, Branson 1944: 399) but hematite in its various forms is available throughout a wider area, including Benton and Hickory counties (Fig. 2.10; Branson 1944: 369; Shumard 1867; Broadhead 1880). It was used aboriginally for pigment and manufacture of some tools – particularly celts. Like chert, it is non-perishable and is a constituent of both survey and excavation collections from Truman Reservoir. Because it is preserved for analysis, further discussion of its availability and its various forms is reserved for the analysis of the hematite in the collections (Roper and Van Ness Vol. II, Pt. 3).

Galena is a sulphide of lead (PbS) and is an important ore of lead. It commonly occurs in Missouri, filling cavities in crushed limestone or in chert, or in limestone or dolomite, or in shale (Keller 1961: 59). According to Branson (1944: 369) and Rafferty (1980: 118), it should occur along the eastern edge of the Truman area in Benton County (Fig. 2.10). Shumard's survey of the mineral lands of R. H. Melton in fact describes in detail the availability of galena – and other minerals – in eastern Benton and Hickory counties (Shumard 1867: 10-24). Kay (1978) describes the use of galena in sparse quantities at Rodgers Shelter. However, the 1977-1980 University of Missouri surveys and excavations did not recover any galena.

Flora

DISTRIBUTION OF MAJOR ZONES

Just as the Truman Reservoir straddles the boundary between two major physiographic provinces of North America, so it also straddles the boundary between two of the continent's major biomes – the oak-hickory forest and the tallgrass prairie (Fig. 2.11a). Perhaps it would be just as accurate, however, to say that Truman Reservoir falls within the broad transition zone between the deciduous forest and the prairies (Fig. 2.11b) for in truth the forests and prairies form a mosaic throughout the entire reservoir and surrounding areas (Fig. 2.12). The composition and

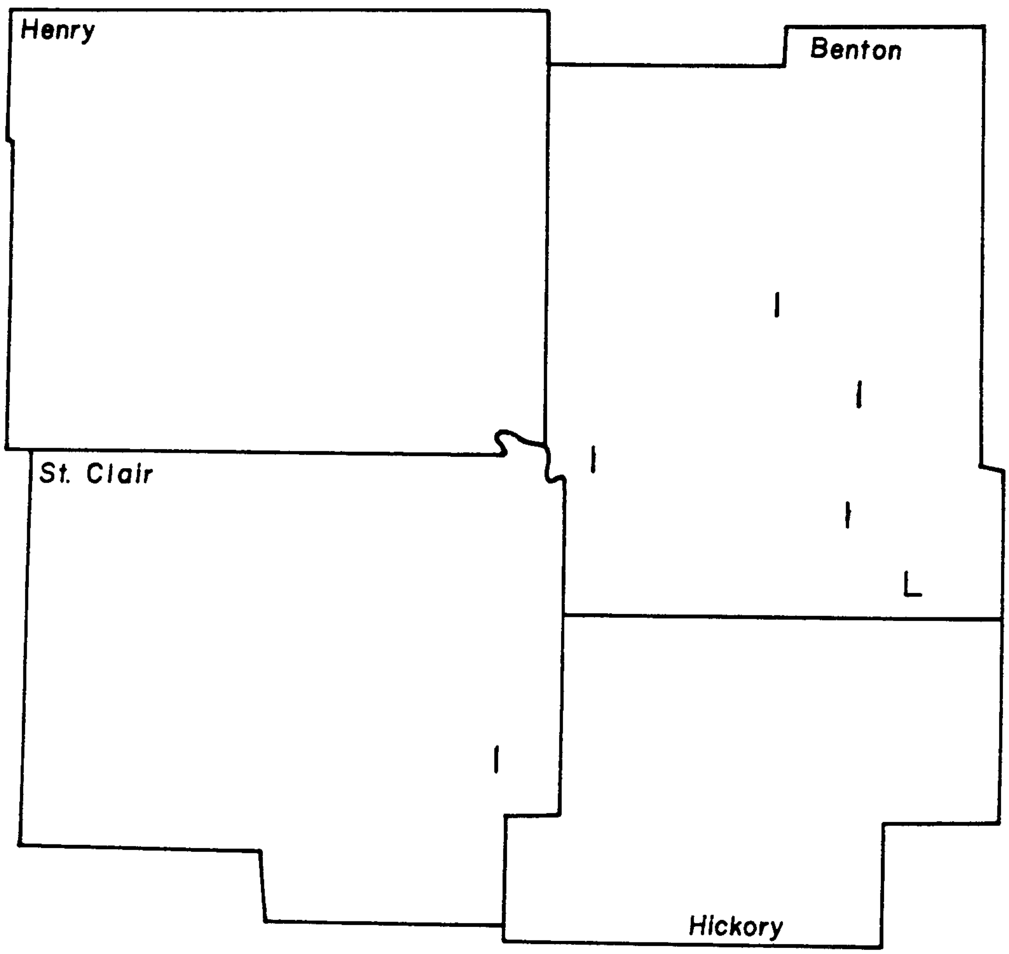


Figure 2.10. Mineral resources in the Truman Reservoir area (l = hematite, L = galena [after Branson 1944: 369]).

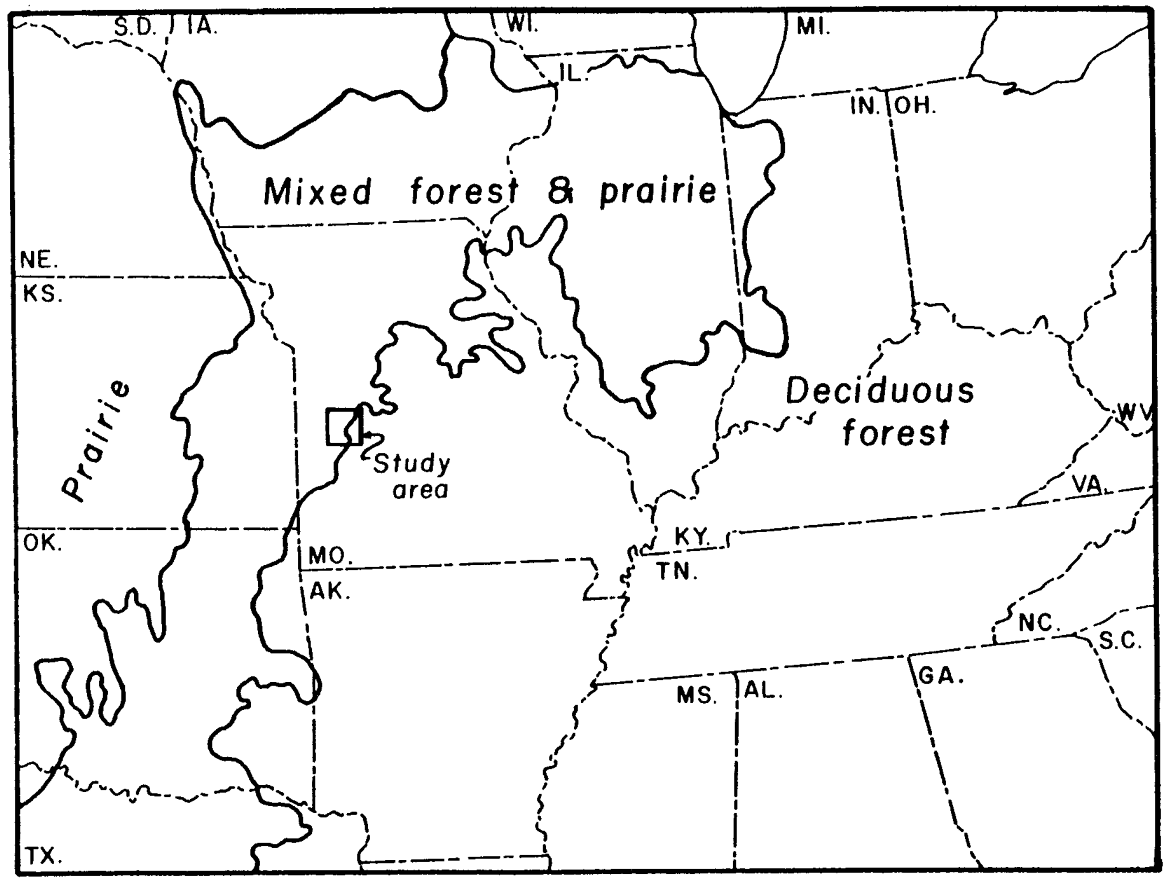


Figure 2.11a. Major biotic provinces in the eastern United States.

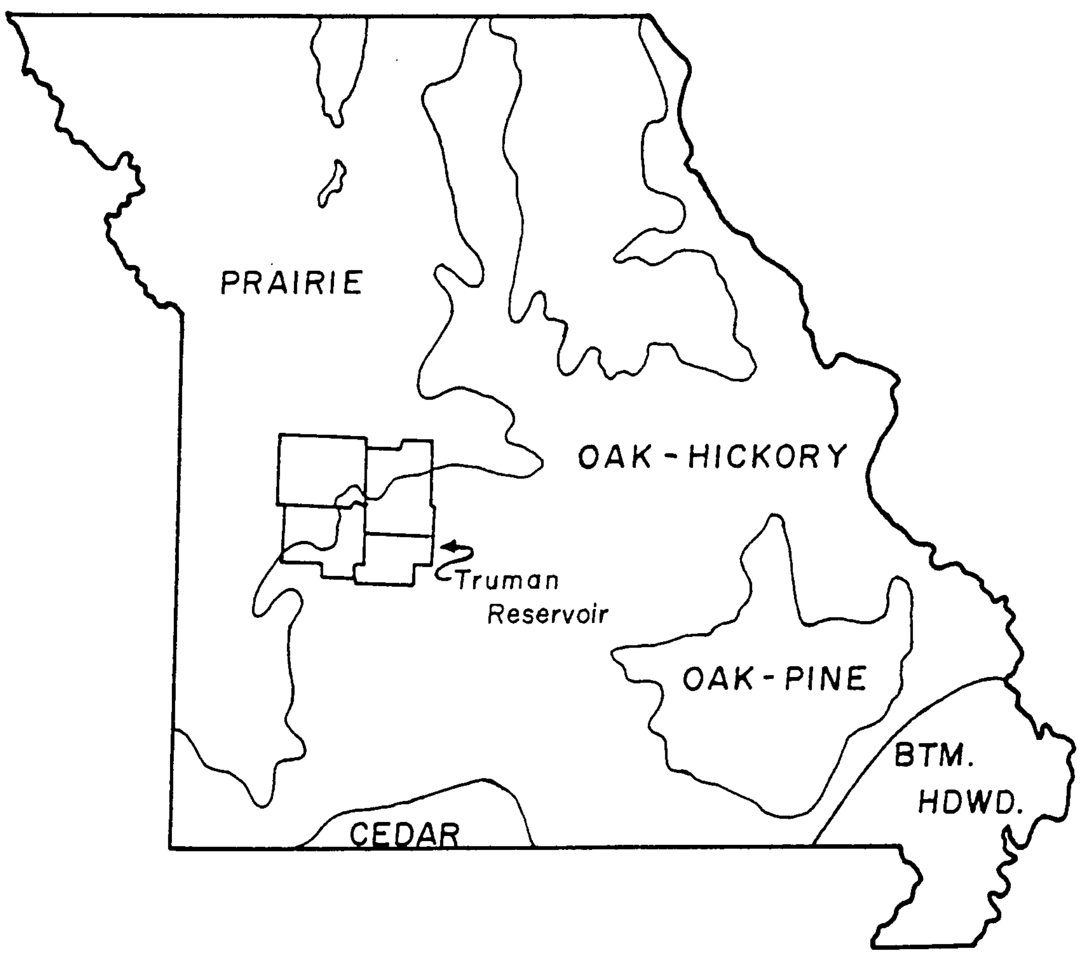


Figure 2.11b. Major biotic provinces in Missouri (after Chapman 1975: 13).

distribution of these major zones have been described in detail by McMillan (1976b: 20-35) and King (1977, 1978). While the major points bear summary here, common sense dictates that these works serve as primary references for this discussion, sparing the expense of consulting the same references and compiling the same species lists for the third or fourth time.

Both McMillan (1976b: 28) and King (1978: 13) have presented maps of major vegetation communities that have been compiled from the records of the Federal Land Surveys. A similar map is presented here as Fig. 2.12.

The southeastern portion of the four-county area, roughly that area comprising the Salem Plateau and Springfield Plain (that is, underlain by Ordovician and Mississippian limestone) is largely covered by oak-hickory forest, with prairie openings on the high, flat interfluves. To the north and west, prairie becomes the dominant vegetation, with oak-hickory forest confined to the bottoms and valley walls of the major streams.

Climatic and geologic factors – including topography, bedrock, and soils – are the principal factors influencing the distribution of forest and prairie (cf. King 1977: 33). King (1977, 1978) has nicely demonstrated this point with a series of diagrams demonstrating the relationship between soil and bedrock (King 1978: 2, 4), bedrock and slope (King 1977: 36; 1978: 7), slope and forest cover (King 1977: 37; 1978: 14). In general soils reflect the bedrock over which they were formed (see Figs. 2.6-2.9). King (1977: 36; 1978: 7) shows graphically that flat uplands to gentle slopes predominate on the Pennsylvanian age sandstones and shales, with slopes greater than 5% being rare. The areas of Mississippian and Ordovician limestones are, however, characterized by a more rugged topography with the majority of slope greater than 5%. Forests infrequently occur on land with less than 2% slope but attain greater prominence on land with increasingly greater slope (King 1977: 37; 1978: 14). By implication, therefore, it would be expected that the sandstone-shale bedrock would most frequently support prairie, with forest on the small areas of steeper slopes, and that the limestones would most frequently support forest, with prairie on the small flat areas. A comparison of Figs. 2.7 and 2.12 shows that this is the case.

COMPOSITION

King (1978) has studied the forests of Benton County and northern Hickory County to represent the forests of the whole reservoir area. She has further divided the forest into four types: bottomland, slope, upland, and barrens. The topographic position of the first three is obvious, the

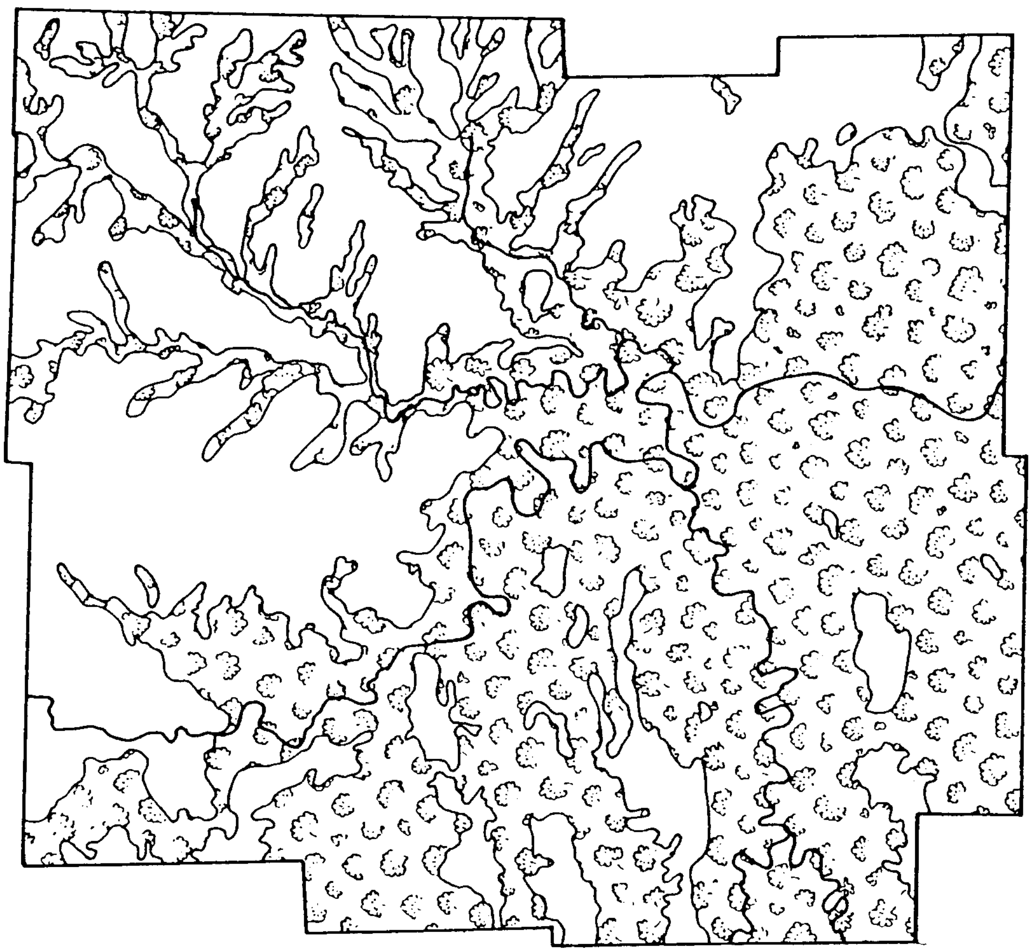


Figure 2.12. Proto-Euro-American vegetation zones in the Truman Reservoir area (after King 1978: 13)

fourth, "barrens," refers to a thinly timbered open woodland, defined by ecologists as having more than one tree per acre but less than half the total area covered by tree canopy (Curtis 1959: 262). Barrens are generally found in slightly rolling uplands where they take on combined characteristics of both forest and prairie.

The relative densities of arboreal species in each of these four zones is shown in Table 2.5. Oaks of one species or another are the predominant member of each forest class, comprising 68.9% of bottomland trees, 88.1% of trees in barrens, 92.7% of trees on the slope, and 94.4% of upland trees. Hickory is the next most common species in all but the bottomlands, comprising 6.3% of bottomland forests, 5.1% of slope forests, 5.7% of upland forests, and 10.6% of the trees in the barrens. Overall, the bottomland forests are the most mixed in composition with walnut, pecan, elms, ashes, hackberry, maples, cherry, and red cedar together comprising 24.3% of trees.

Understory in the different forest zones has been described by King (1978: 31-44) on the basis of the study of modern forest plots along the Pomme de Terre River. Undergrowth plants recorded are listed in Table 2.6.

The Federal land surveyors, while recording when they entered and left the prairie, did not record the composition of the prairies they crossed. Unfortunately, none of these prairies remain for modern study. It is therefore necessary to rely on extrapolations to describe their composition. Kucera (1961: 226) has listed the principal species as in Table 2.7.

SEASONAL AND SPATIAL DISTRIBUTION OF EDIBLES

The archeological study of hunter-gatherers, with its emphasis on the relation of hunter-gatherer societies to the resources on which they depended for survival, is somewhat less interested in forest and prairie composition _per se_ and somewhat more interested in the seasonal and spatial availability and yield of edible resources — particularly those edible resources on which prehistoric peoples depended.

An important contribution to the study of hunter-gatherer subsistence in the Ozarks is King's (1976b) compilation of potential food plants of the western Ozarks. In it are listed 206 species that are both regarded as edible and as occurring in the Truman Reservoir area of Missouri (King 1976b: 249), along with the part or parts used, and the habitats and seasons in which the parts are available. In describing habitat, King has used eight basic habitat types: upland prairie, bluffs or glades, oak-hickory forest, open woodland, bottomland forest, bottomland prairie, marsh or

TABLE 2.5

Relative Tree Density — Benton County
(After King 1978: 23)

	Bottomland	Slope	Upland	Barrens
Post-oak	11.7	41.1	50.9	54.7
Black oak	18.0	26.2	18.9	20.0
White oak	8.1	12.6	-	4.0
Blackjack oak	1.8	6.2	18.9	2.7
Bur oak	18.9	1.1	1.9	-
Red oak	-	-	-	-
Chinkapin oak	1.8	2.3	-	1.3
Pin oak	7.2	3.0	1.9	2.7
Water oak	1.4	.2	-	2.7
S oak	-	-	-	-
Oak (Quercus spp.)	-	-	1.9	-
Black Hickory	.9	.2	-	5.3
White hickory	-	.2	-	-
Shagbark hickory	-	-	-	1.3
Hickory (Carya spp.)	5.4	4.7	3.8	4.0
Pecan	.9	-	-	-
Black Walnut	4.5	.8	-	1.3
Butternut	-	-	-	-
Elm (Ulmus spp.)	8.1	.8	-	-
White elm	3.6	-	-	-
White ash	.9	.2	-	-
Ash	1.8	.4	-	-
Hackberry	.9	-	-	-
Honey locust	-	-	-	-
Sycamore	-	-	1.6	-
Persimmon	-	-	-	-
Red cedar	.9	-	-	-
Sugar maple	.9	-	.6	-
Maple	.9	-	-	-
Cherry	.9	-	-	-
Basswood	-	.2	-	-
	99.5	100.2	100.4	100.0

TABLE 2.6

Understory Constituents of Benton County Forests
(After King 1978: 31-44)

Upland

Spicebush (*Lindera benzoin*)
Rose (*Rosa spp.*)
Poison Ivy (*Rhus radicans*)
Dogwood (*Cornus* spp.)
Virginia creeper (*Parthenocissus quinquefolia*)
Greenbriar (*Smilax* spp.)
Bedstraw (*Galium* spp.)
Tick trefoil (*Desmodium* spp.)
Bush clover (*Lespedeza* spp.)
Pussytoes (*Antennaria neglecta*)
Mountain mint (*Pycnanthemum tenufolium*)

Slopes

Fragrant sumac (*Rhus aromatica*)
Dogwood
Virginia creeper
Redbud
Buckbrush (*Symphoricarpos orbiculatus*)
Pussytoes
Goldenrod (*Solidago* spp.)
Bush clover
Tick trefoil

Lower slopes

Virginia creeper
Buckbrush
Grape
Spicebush
Gooseberry (*Ribes* spp.)
Pawpaw
Touch-me-not (*Impatiens* spp.)
Violets (*Viola* spp.)
Wild ginger (*Asarum canadense*)
Nettles (*Laportea* sp.) (*Urtica* sp.)
Bloodroot (*Sanguindria canadensis*)
Mayapple (*Podophyllum peltatum*)

Bottoms

Virginia creeper
Dogwood
Buckbrush
Trumpet creeper (*Campsis radicans*)
Grape (*Vitis* spp.)
Greenbriar

TABLE 2.7

Principal Prairie Species
(after Kucera 1961: 226)

Big bluestem (Andropogon gerardi)

Little bluestem (Andropogon scoparius)

Indiana grass (Sorghastrum nutans)

Wild rye (Elmyus canadensis)

June grass (Koeleria cristata)

Dropseed (Sporobolus heterolepis)

Switch grass (Panicum virgatum)

Slough grass (Spartina pectinata)

Sideoats grama (Boutelous curtipendula)

aquatic habitat, and disturbed ground. The relative topographic positions of the first seven are shown, following King (1978: 64) in Figure 2.13. Seasons are listed as late winter/early spring, spring, late spring/early summer, summer, late summer/early fall, fall, late fall/early winter, and winter. The number of species available in each season is shown for each habitat in Figure 2.14. Parts are grouped as cambium, sap, flowers, tubers/roots, greens, fruits, seeds, and nuts.

Late winter/early spring (February and mid-March) is clearly a very poor time of year for gathering vegetal foods. Sap, cambium or bark, and tubers and roots are most of what is available. One or two species of greens and seeds remain available throughout the winter as do perhaps a few fruits such as hackberry (Phillips 1979: 97).

Spring, however, is a time of plenty. Many species of tubers and roots are available, and a wide diversity of greens are to be had. Oak-hickory forest, open woodland, and especially the diverse bottomland are especially productive.

Availability of greens and tubers decreases somewhat by the late spring/early summer. In some instances, at least, these parts are still available but have become tough and woody and are no longer very appetizing. Overall, however, a large although changing selection of greens, roots and tubers remains until frost.

By late spring/early summer, fruits begin to appear, reaching their peak of availability in the summer. Oak-hickory forest and open woodland are particularly productive of fruits. Seeds also begin to become available, although their peak is reached in the fall. Diversity of edible seeds is greatest in the upland prairie, bluffs/glades, marsh/aquatic habitat, bottomland forest, and on disturbed ground.

By the fall, then, greens, roots and tubers, and many fruits are still available, and now nuts become available in the oak-hickory forest, bluff/glades, and bottomland forest zones. A wide variety of nuts are available, although as seen in the previous section and as will be discussed in the next section, the relative densities of some of these species are low.

With the frost comes a greatly diminished availability of plant foods. Tubers and roots may be available throughout the year and a gradually depleted supply of seeds and nuts may be found. Overall, however, it will be the following spring before plant foods are once again available in any abundance.

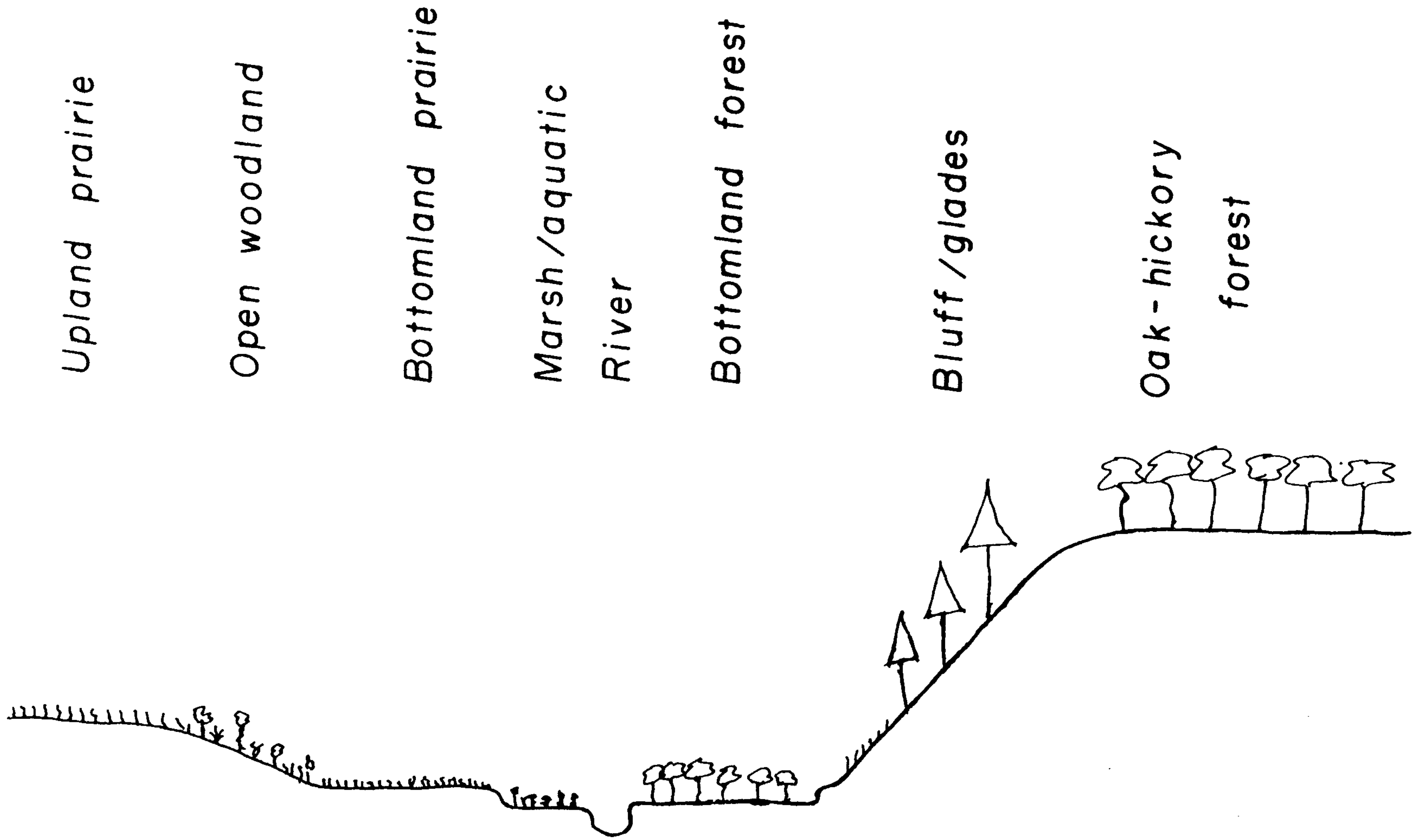


Figure 2.13. Relative topographic positions of vegetation zones.

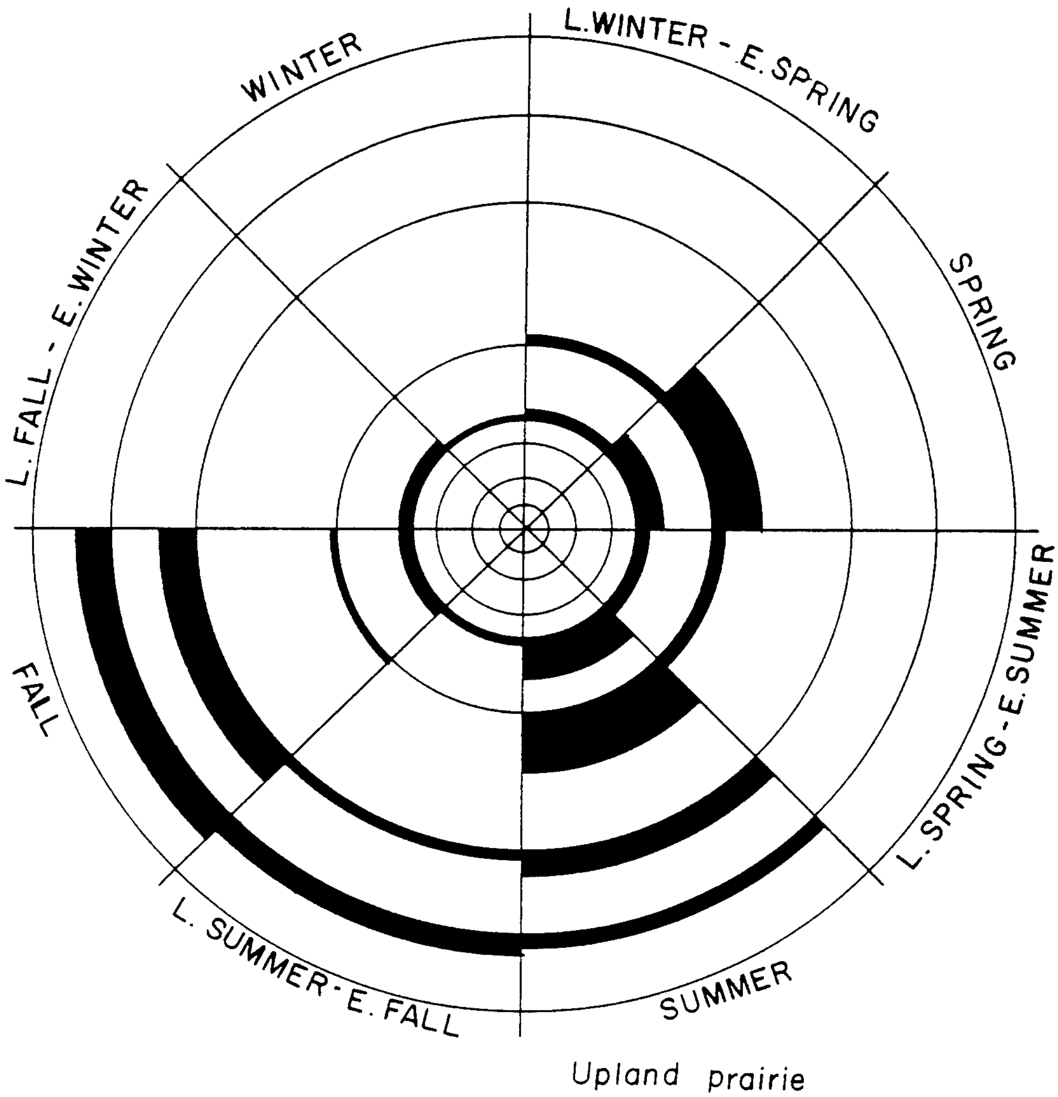


Figure 2.14a. Seasonal species availability of plants - upland prairie.

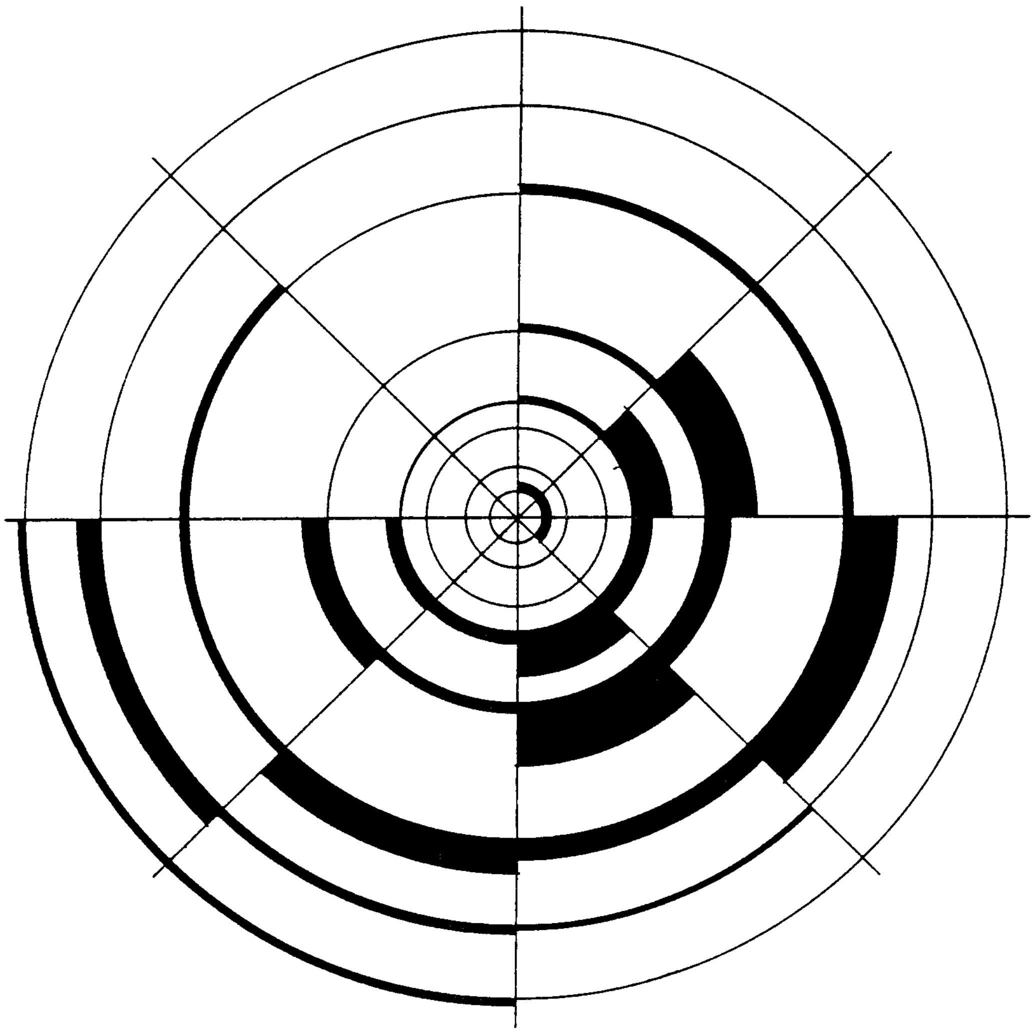


Figure 2.14b. Seasonal species availability of plants - open woodland.

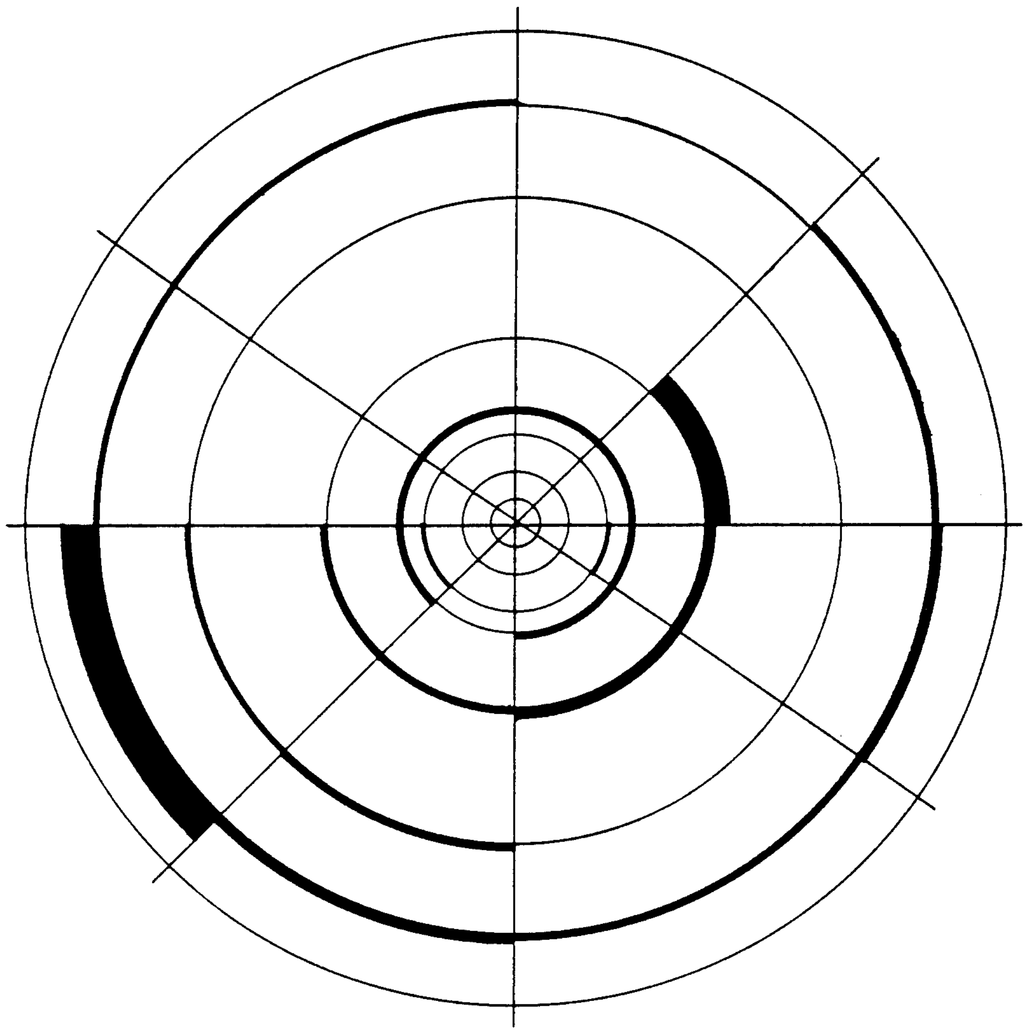


Figure 2.14c. Seasonal species availability of plants - disturbed ground.

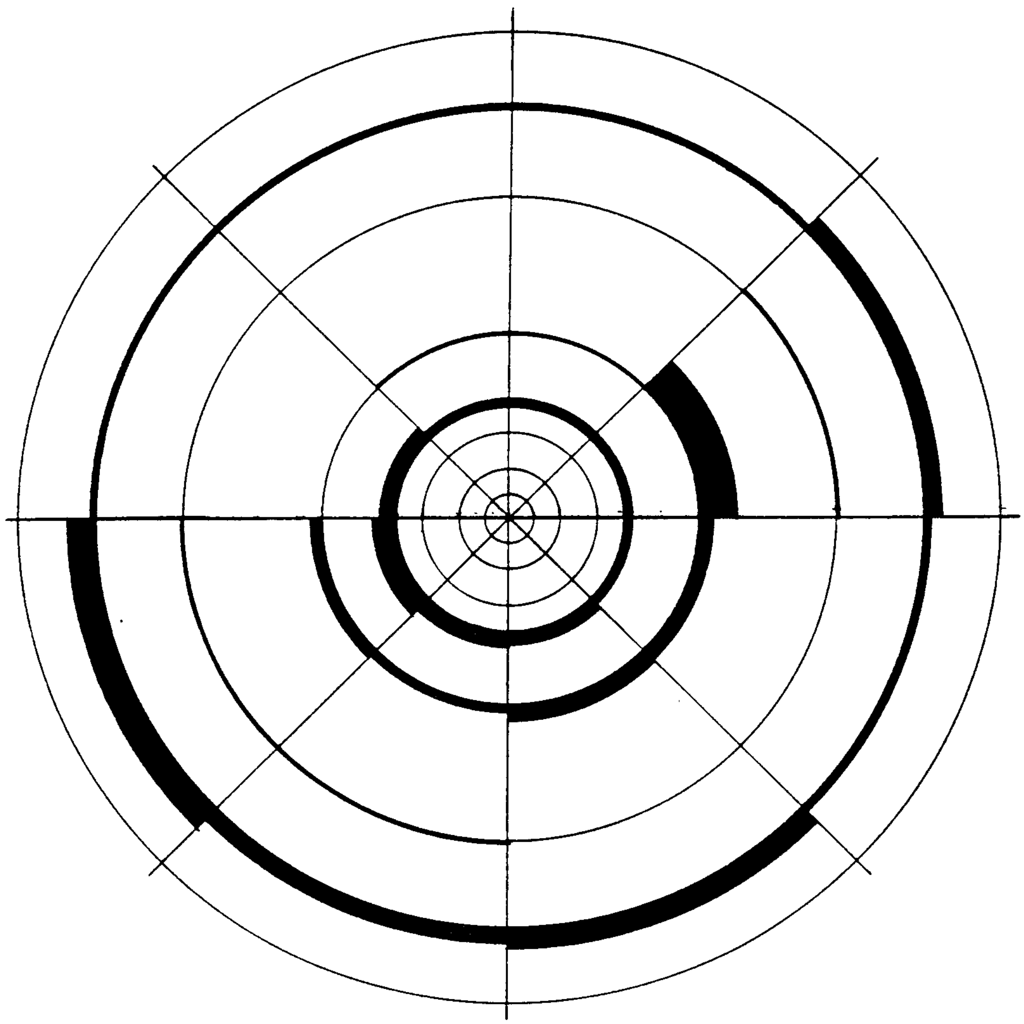


Figure 2.14d. Seasonal species availability of plants - marsh/aquatic.

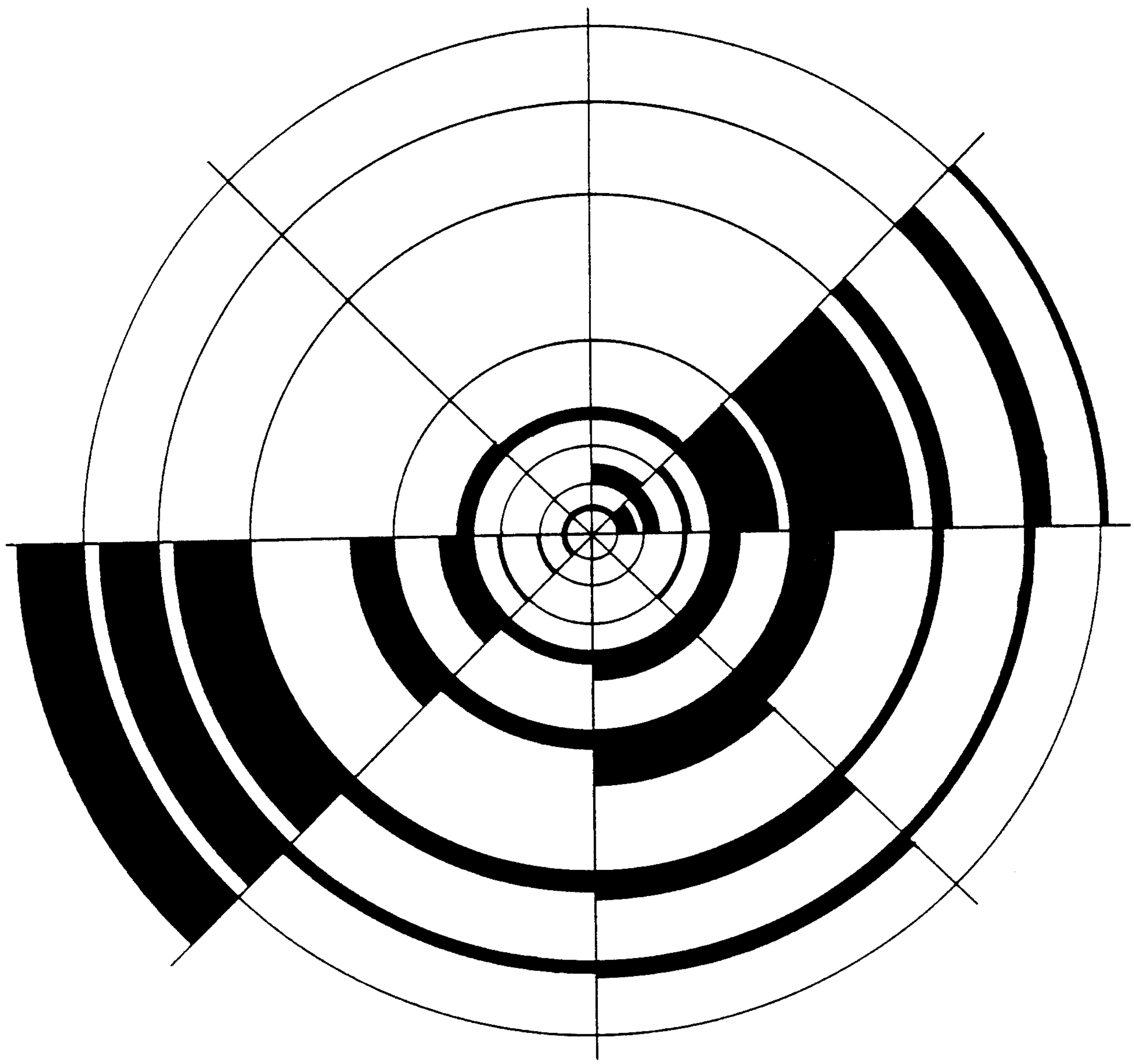


Figure 2.14e. Seasonal species availability of plants - bottomland fores.

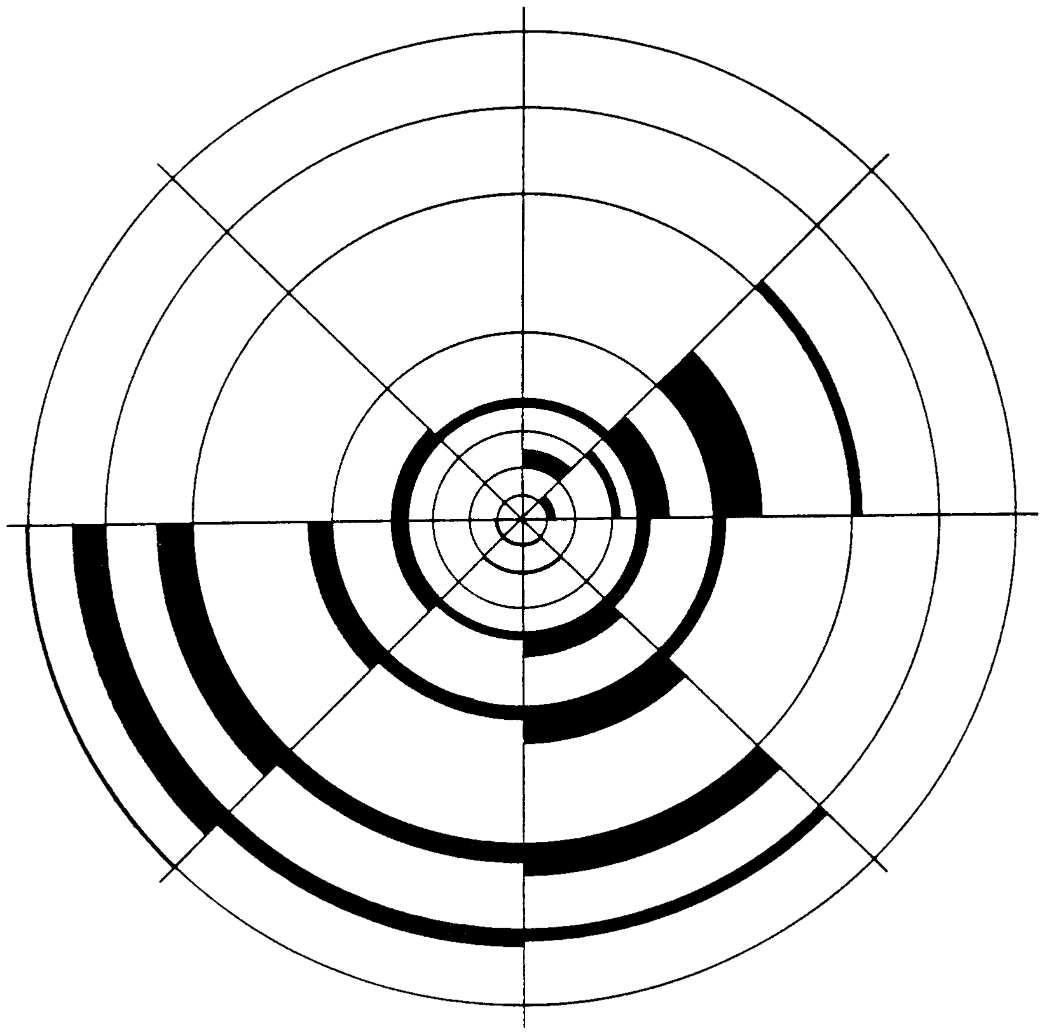


Figure 2.14f. Seasonal species availability of plants - bluff/glades.

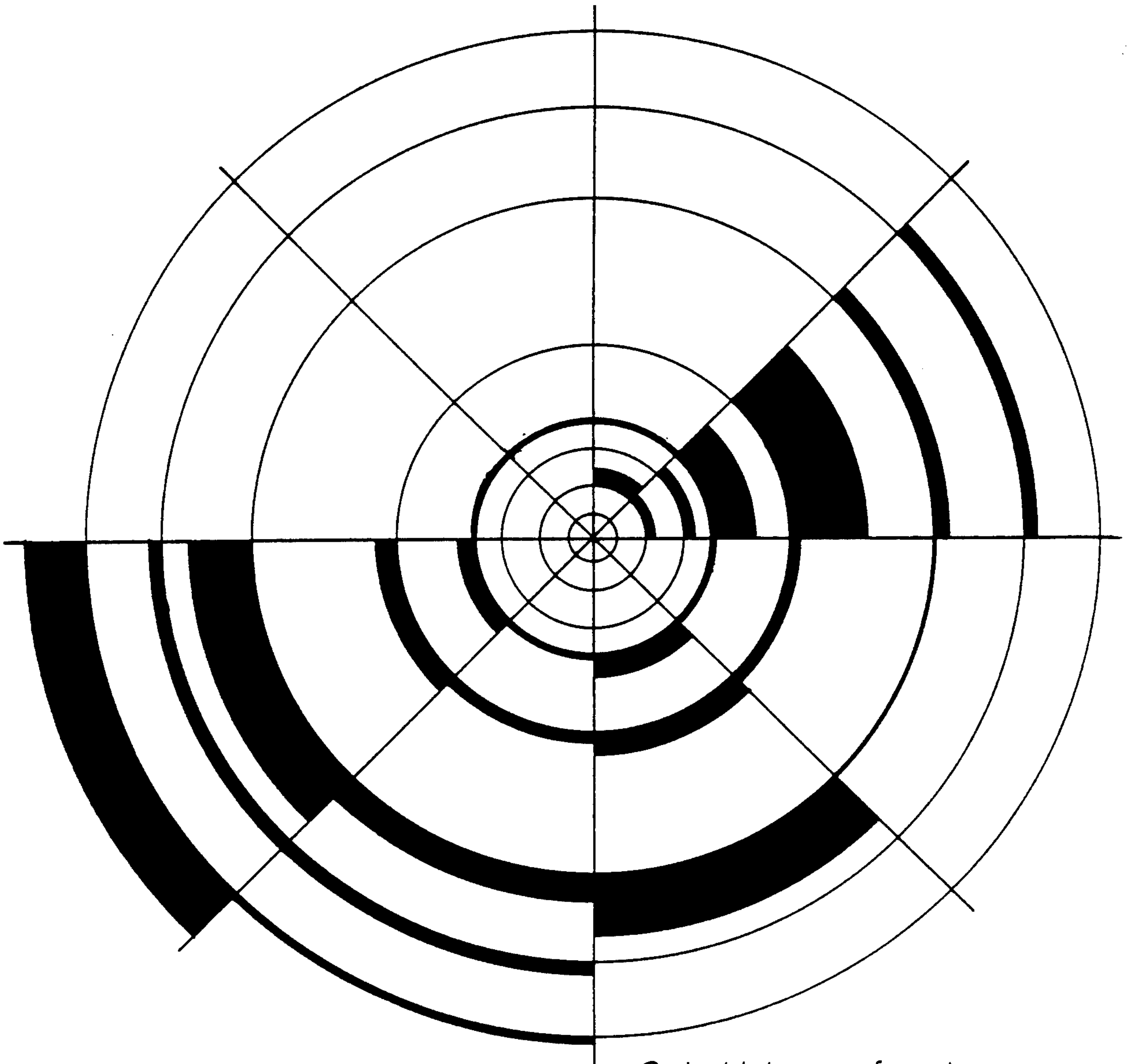


Figure 2.14g. Seasonal species availability of plants - oak-hickory forest.

YIELD

Data are available to make general calculations of the yield of several important species of nuts. These figures are given in Table 2.8. Comment on these figures and a comparison with other parts of the eastern United States is reserved for a later chapter.

Fauna

The forest-prairie mosaic of the Truman Reservoir supports a diverse fauna, including species most commonly found in forest, in prairie, and in the edge between forest and prairie. In spite of the wealth of faunal remains from Rodgers Shelter and Phillips Spring, less detailed description of faunal availability, distribution, and yield is available than for flora. Faunal remains are exceedingly rare in the open sites that form the bulk of the sites described in this report. However, settlement system analysis, even when conducted almost entirely on site distributions and lithics, assumes that site locations and functions reflect decisions made during the course of resource procurement. The strategy of resource procurement is in turn partially a response to the availability and habits of the local fauna. Some understanding of the local fauna is therefore important as background for the Truman Reservoir investigations.

MAMMALS

McMillan (1976b: 36-37) lists 53 species of mammals either presently available in the Truman Reservoir or formerly available. Table 2.9 lists these species. Habitats, as tabulated by McMillan (1976b: 36-37), and habits, following Schwartz and Schwartz (1959) and Burt and Grossenheider (1964) are also given.

The list includes 1 marsupial, 3 insectivores, 11 bats, 2 lagomorphs, 20 rodents, 13 carnivores, and 3 artiodactyls. The primary and secondary habitats of species within each order (except chiroptera) are summarized in Figure 2.15. The superiority of the forest border over either the prairie or oak-hickory forest is clearly reflected. Fifteen species find either their primary or secondary habitat in the prairie, 22 inhabitat the oak-hickory forest, and 29 are found in the forest border area. (The economically unimportant Chiroptera, bats, are not included in these totals.) Eighteen of 42 species (exclusive of bats) are nocturnal or chiefly so. Most of these are carnivores. Nine species either hibernate or are at least show considerably reduced activity in winter.

TABLE 2.8

Yields of Several Nut Species
(Based on Data in King 1976a: 264 and 1978: 23)

Species	Bottoms			Slope			Barrens		
	%	Trees	Yield	%	Trees	Yield	%	Trees	Yield
Oaks	68.9	14.98	3.74 - 22.47	92.7	30.94	7.74 - 46.41	88.1	11.60	2.90 - 17.40
Hickories	6.3	1.37	2.05 - 4.11	5.1	1.70	2.55 - 5.11	10.6	1.40	2.09 - 4.19
Black walnut	4.5	.98	.98 - 2.93	.8	.27	.27 - .80	1.3	.17	.17 - .51

TABLE 2.9

Mammals of the Truman Reservoir Area
(After McMillan 1976b: 36-37; Schwartz and Schwartz 1959; Burt and Grossenheider 1964)

	Prairie	Forest Border	Oak-Hickory Forest	Bottomland Forest	Bottomland Prairie	Aquatic	Solitary or Gregarious[3]	Nocturnal	Hibernates[2]
Order Marsupialia									
Opossum		2[1]	2	1				+	*
Order Insectivora									
Short-tailed Shrew			2	1				+	
Least Shrew	1	2							
Eastern Mole	1	2							
Order Chiroptera (11 Species)		2	2	1	2			+	+
Order Lagomorpha									
Black-Tailed Jackrabbit	1								
Eastern Cottontail Rabbit		1							
Order Rodentia									
Woodchuck		2	1	2					+
Thirteen-Lined Ground Squirrel	1	2					S		+
Eastern Chipmunk		2	1				S		*
Eastern Grey Squirrel		2	2	1					
Eastern Fox Squirrel		1	2	2					
Southern Flying Squirrel			1	2				+	
Plains Pocket Gopher	1	2							
Beaver						1			
Western Harvest Mouse	1	2							
Fulvous Harvest Mouse	1	2			2				
Prairie White-Footed Mouse	1	2							
Woodland White-Footed Mouse		2	1	2					
Common Cotton Rat	2	1							
Eastern Wood Rat		2	1	2				+	
Southern Bog Lemming				2	1				*
Prairie Vole	1	2							
Meadow Vole					1				
Pine Mouse		2	1						
Muskrat						1		+	
Meadow Jumping Mouse				2	1			+	+
Order Carnivora									
Coyote	1	2	2					+	
Grey Wolf		2	1	2					
Red Fox		1	2					+	
Grey Fox		2	1				Sec	+	
Black Bear			2	1			S	+	*
Raccoon			2	1	2			+	
Long-Tailed Weasel	2	2	1					+	
Mink				1			S	+	
Badger	1	2						+	*
Spotted Skunk	1	2						+	
Striped Skunk		1	2	2			S	+	*
Bobcat		2	1	2			S	+	
Mountain Lion		2	1	2			Sec	+	
Order Artiodactyla									
White-Tailed Deer		1	2	2	2				
Elk			1	2	2		G		
Bison	1						G		

1 - Key: 1 = primary habitat, 2 = secondary
2 - Animal hibernates or is inactive in winter: + = true hibernator; * = does not hibernate but is inactive in cold weather
3 - Solitary or Gregarious: S = solitary; G = gregarious or herd animal; Sec = secretive

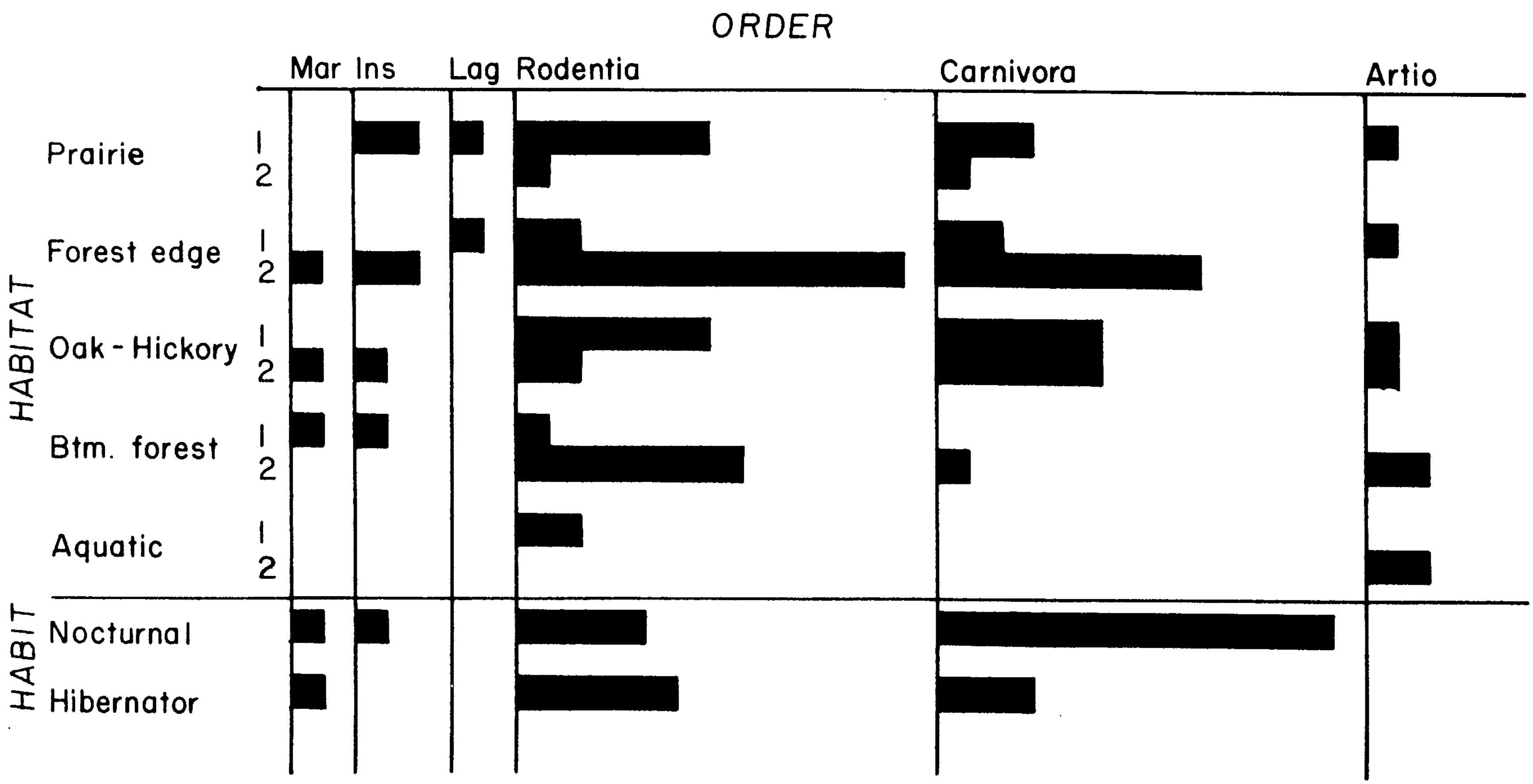


Figure 2.15. Habitat preferences and habits of mammalian orders.

BIRDS

Birds in the study area are numerous and, with a few exceptions, are largely unimportant economically. Because of this, no attempt has been made at producing a comprehensive list of avifauna.

Probably the most important bird was the forest-dwelling wild turkey. Shelford (1963: 59) suggests that turkeys reach their largest populations in the oak-hickory forest, and Cleland (1965: 47) has pointed out that they are considered forest birds to such an extent that ecologists have referred to an oak-turkey biome. Brendel (1980) has recently discussed the wide variety of uses to which the turkey was put. Other than turkey, forest birds include the broad-winged hawk, long-eared owl, tanagers, nuthatches, and several species of woodpeckers (Cleland 1966: 245).

The prairie chicken and sandhill crane were probably the most important prairie avian species. The meadowlark, dickcissel, and horned lark (Shelford 1963: 336), short-eared owl, curlews, and red-tailed and red-shouldered hawks (Cleland 1966: 245) are all also prairie species.

An even wider variety of birds inhabits the forest-edge or barrens. Turkey probably extends its range into this zone. Additionally (Shelford 1963: 315-316) and Cleland (1966: 245) both list major species, most of which are small birds and which, expectably, include both forest and prairie species.

Waterfowl is generally an economically important group of species. Much of Missouri is within the Mississippi Flyway and includes a wide variety and high density of waterfowl. McMillan (1976b: 38) reports waterfowl on the Osage River bottoms near the mouth of the Pomme de Terre. Waterfowl also were found in large quantity on the South Grand River in Henry County.

AMPHIBIANS AND REPTILES

Twenty-two species of amphibians, including 11 salamanders, 3 toads, and 8 frogs inhabit the Truman area (McMillan 1976b: 39). None have any prehistoric economic importance.

Reptiles, at least some species, are however common in Ozark archeological faunal lists. Available species, as given by Anderson (1965), are listed, exclusive of snakes, in Table 2.10. Habitats are also given.

FISH

McMillan (1976b: 40-41) has compiled a list of 98 species of fish available in streams of the Ozark border area.

TABLE 2.10

Reptiles of the Truman Reservoir Area

Species	Habitat
Common snapping turtle	Aquatic, muddy ponds & streams
Stinkpot	Aquatic, muddy ponds & streams
Three-toed box turtle	Brushy, timbered hillsides to open flat areas
Ornate box turtle	Prairie
Map turtle	Aquatic, bays & backwaters of larger streams
Mississippi map turtle	Aquatic, bays & backwaters of larger streams
Ouchita map turtle	Aquatic, quiet sections of rivers
Western painted turtle	Aquatic, shallow water in mud bottom sloughs & ponds
Red-eared turtle	Aquatic, quiet, vegetation around water
Western spiny soft-shelled turtle	Aquatic, rivers with soft mud bottoms
Smooth soft-shelled turtle	Aquatic, rivers with soft bottoms
Eastern collared lizard	Rocky ledges
Northern fence lizard	Open timbered hillsides
Western slender grass lizard	(Rare - habitat uncertain)
Six-lined racerunner	Sparsely wooded hilltops
Ground skink	Wooded areas
Five-lined skink	Moist wooded areas
Broad-headed skink	Arboreal
Southern coal skink	Moist areas (eastern part of reservoir only)

Faunal lists from those sites in the area with preserved bone contain few fish remains.

MUSSELS

Klippel, Celmer, and Purdue (1978) have reported the results of mussel collections made at various loci along the Pomme de Terre River, showing the inter-habitat diversity of molluscan fauna. Mussels were used at Rodgers Shelter, but while their use was never important, it did increase through the Archaic period (Klippel, Celmer, and Purdue 1978: 269).

DISCUSSION

In this brief outline of fauna, emphasis has been placed on listing available species and their habitats. However, various species are apt to be found in different zones or to be unavailable at various times of the year. For example, Smith (1974) has documented variation in deer availability by season and annual variation in most of the southeast Missouri Ozarks. We have already seen that some species of mammals hibernate in the winter; and some species such as waterfowl simply are not present in the general area throughout the year. The above descriptions must, therefore, be taken as general and further detail sought, when needed, for the specific habits of various species.

Environmental Change

The baseline for description of various environmental elements has been the present or the very recent past. However, the decade of investigations at Rodgers Shelter and the surrounding portion of the Pomme de Terre River Valley preceding the recent Corps of Engineers contracts has concluded that the environment has not been a constant. Major changes have occurred in climate, with attendant changes in hydrology, flora, and fauna, and perhaps also ease of access to various mineral resources. The environmental model portrays the environmental dynamics of a period of greater than 40,000 years and includes the major fluctuations that occurred during the Holocene. Since these will be of major archeological consequence, they are briefly outlined here. Relevant topics are further considered in other chapters as appropriate.

The first major change of consequence to human occupation of the central Osage River Basin is that associated with the end of the Pleistocene. The late Pleistocene forest was a spruce forest with a mixture of deciduous elements (King 1973: 562; King and Lindsay 1976: 76), accompanied by now-extinct megafauna. By 12,000 years ago, however, the spruce forest had been replaced by a deciduous forest, and the Pleistocene fauna had been replaced by a species mix similar to that described in this chapter.

In gross outline, the early Holocene environment was perhaps even milder than that of today. European climatic evidence for the same period suggests warmer temperatures than today (Gaskell and Morris 1979: 42) and certainly conifer and boreal forests of North America were retreating northward during this time (Wendland 1978: 278-279). King (1978: 75) projects a greater diversity of resources available during this period than at any time subsequently.

The warming trend continued for several millennia culminating between 7000 and 5500 B.P. During this period the grasslands, which had all along been shifting eastward, reached their easternmost extent (Wendland 1978: 278). The Rodgers Shelter sediment (Ahler 1976) and faunal (McMillan 1976a: 228-229) studies suggest a more open environment surrounding the shelter. General climatic models suggest a temperature several degrees higher than at present (Gaskell and Morris 1979: 42; Wendland 1978: 279) although some feel that temperatures have not changed since around 10,500 years ago (Webb and Bryson 1972). King (1980: 10-11) has suggested that reduced precipitation had become a factor by 9000 B.P., peaked by 7000 B.P., and continued for several thousand years, ending at various times in various places. Benedict (1978) has suggested that this "long drought" is really two shorter droughts, separated by a moist interval. In any event, King (1978: 74) has projected greatly reduced plant food availability during the Hypsithermal.

Recovery from the Hypsithermal is variously dated. The dates of 5700 B.P. in southeast Missouri and 5100 B.P. at Muscotah Marsh in northeastern Kansas (King 1980: 11) should bracket the dates for the end of the Hypsithermal in the Truman Reservoir area. The grassland border thus gradually attained its modern position, shown in Figure 2.11a. However, King (1980: 11) has also noted that

> The pollen data from the late Holocene does not suggest a return to pre-Hypsithermal conditions. Rather the post-Hypsithermal period was a climatic regime of its own, more mesic than the dry period that preceded it but with less effective moisture than the early Holocene.

Climate has not been a constant during the post-Hypsithermal. Several climatic episodes of shorter duration and less severe effect on the distribution of vegetation zones have taken place during this period. They have been dated by Wendland and Bryson (1974) and described by a variety of authors, including Wendland (1978: 281). European records for the last 1000 years are particularly good and the climatic histories of this period are interesting examples of major historic events and their occurrence at the time of major climatic anomalies (see e.g., Bryson and Murray 1977: 47-91,

especially Ladurie 1971). The contemporaneous climatic history of North America is less directly recorded, nevertheless, there is a voluminous literature correlating cultural change with climatic episodes during the last millennium. Inasmuch as little direct evidence for environmental change during this period is available from Truman Reservoir and since nothing in the archeological record suggests a response to environmental change, we will leave the discussion of environmental change as it is.

Summary

This chapter has outlined the biophysical environment of the Truman Reservoir area as recently observed and described. Description focused on climate, hydrology, topography, soils, mineral resources, plant resources, and animal resources, and on gross environmental change during the Holocene. A number of these topics are treated in greater detail by specialists elsewhere in this report (Vol. II, Pt. 3; Vol. III) or are expounded upon where relevant to the discussion.

REFERENCES CITED

Ahler, Stanley A.
1976 Sedimentary processes at Rodgers Shelter. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 123-139. Academic Press, New York.

Allgood, Ferris P. and Ival D. Persinger
1979 Missouri general soil map and soil association descriptions. U.S. Department of Agriculture, Soil Conservation State Office, Columbia, Missouri.

Anderson, Kenneth H.
1979 Geologic map of Missouri. Missouri Geological Survey and Water Resources, Rolla.

Anderson, Paul
1965 The reptiles of Missouri. The University of Missouri Press, Columbia.

Benedict, James B.
1978 The Mount Albion Complex and the Altithermal. In The Mount Albion Complex, by James B. Benedict and Byron L. Olson, pp. 139-180. Center for Mountain Archeology Research Report No. 1, Ward, Colorado.

Brakenridge, G. Robert
n.d. The impact of climatic change on floodplain sediment, soil formation, and eolian activity in southern Missouri. Ms submitted for publication.

Branson, E. B.
1944 The geology of Missouri. University of Missouri Studies 19(3).

Brendel, S. J.
1980 Wild turkey remains in Ozark bluff shelters. The Missouri Archaeologist 41: 94-106.

Bretz, J Harlan
1965 Geomorphic history of the Ozarks of Missouri. Missouri Geological Survey and Water Resources 41.

Broadhead, G. C.
1880 Geologic report upon the mineral lands of Major Melton. Eagle Print, Sedalia.

Bryson, Reid A. and Thomas J. Murray
1977 Climates of hunger. The University of Wisconsin Press, Madison.

Burt, William H. and Richard P. Grossenheider
1964 A field guide to the mammals, 2nd edition. Houghton Mifflin Co., Boston.

Chapman, Carl H.
1975 The archaeology of Missouri, I. The University of Missouri Press, Columbia.

Christenson, Andrew L., Walter E. Klippel, and William Weedman
1975 An archaeological survey of the proposed William L. Springer Lake Greenbelt project. Report to the U.S. Army Corps of Engineers, Illinois State Museum Society.

Cleland, Charles E.
1965 Faunal remains from bluff shelters in northwest Arkansas. The Arkansas Archeologist 6(2-3): 39-63.

1966 The prehistoric animal ecology and ethnozoology of the upper Great Lakes Region. University of Michigan Museum of Anthropology, Anthropological Papers 29.

Collier, J. E.
1955 Geographic regions of Missouri. Annals of the Association of American Geographers 45(4): 368-392.

Curtis, John T.
1959 The vegetation of Wisconsin: an ordination of plant communities. The University of Wisconsin Press, Madison.

Fenneman, Nevin M.
1938 Physiography of eastern United States. McGraw-Hill Book Company, New York.

Gaskell, T. F. and Martin Morris
1979 World climate. Thames and Hudson, London.

Grogger, Harold E. and Ival D. Persinger
1976 Soil Survey of Henry County, Missouri. U.S.D.A. Soil Conservation Service, in cooperation with the Missouri Agricultural Experiment Station.

Haynes, C. Vance

1976 Late Quaternary geology of the lower Pomme de Terre River Valley. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 47-61. Academic Press, New York.

1977 Report on geochronological investigations in the Harry S. Truman Reservoir area, Benton and Hickory Counties, Missouri. Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. X, Environmental Study Papers, pp. 23-32. Report to the U.S. Army Corps of Engineers, American Archaeology Division, University of Missouri-Columbia.

Hunt, Charles B.

1974 Natural regions of the United States and Canada. W. H. Freeman, San Francisco.

Johnson, Donald L.

1977 Soil and soil-geomorphic investigations in the lower Pomme de Terre valley. Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. X, Environmental Study Papers, pp. 59-139. Report to the U.S. Army Corps of Engineers, American Archaeology Division, University of Missouri-Columbia.

Kay, Marvin, et al.

1978 Rodgers Shelter techno-functional studies. In Holocene adaptations within the lower Pomme de Terre River valley, Missouri, edited by Marvin Kay, Ch. 7. Report to the U.S. Army Corps of Engineers, Illinois State Museum Society.

Keller, W. D.

1961 The common rocks and minerals of Missouri. The University of Missouri Press, Columbia.

King, Frances B.

1976a Forest density and nut production potential for the Rodgers Shelter area. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 261-265. Academic Press, New York.

1976b Potential food plants of the western Missouri Ozarks. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 249-260. Academic Press, New York.

1977 Spatial and temporal distribution of plant resources in the Harry S. Truman Reservoir. Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. X, Environmental Study Papers, pp. 33-58. Report to the U.S. Army Corps of Engineers, American Archaeology Division, University of Missouri-Columbia.

1978 Vegetational reconstruction and plant resource prediction. In Holocene adaptation within the lower Pomme de Terre River valley, Missouri, edited by Marvin Kay, Chapter 2. Report to the U.S. Army Corps of Engineers, American Archaeology Division, Illinois State Museum Society.

King, James E.
1973 Late Pleistocene palynology and biogeography of the western Ozarks. Ecological Monographs 43(4): 539-565.

1980 Post-Pleistocene vegetational change in the midwestern United States. In Archaic prehistory on the Prairie-Plains border, edited by Alfred E. Johnson, pp. 3-11. University of Kansas Publications in Anthropology 12.

King, James E. and Everett H. Lindsay
1976 Late Quaternary biotic records from Spring deposits in western Missouri. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 63-78. Academic Press, New York.

Klippel, Walter E., Gail Celmer, and James R. Purdue
1978 The Holocene naiad record at Rodgers Shelter in the western Ozark Highland of Missouri. Plains Anthropologist 23(82, Pt. 1): 257-271.

Kucera, C. L.
1961 The grasses of Missouri. University of Missouri Studies 35: 1-241.

Ladurie, Emmanuel LeRoy
1971 Times of feast, times of famine: a history of climate since the year 1000. Translated by Barbara Bray. Doubleday, New York.

Leopold, Luna B.
1974 Water: a primer. W. H. Freeman, San Francisco.

Leopold, Luna B., M. Gordon Wolman, and John P. Miller
1964 Fluvial processes in geomorphology. W. H. Freeman, San Francisco.

McMillan, R. Bruce

1976a The dynamics of cultural and environmental change at Rodgers Shelter, Missouri. In _Prehistoric man and his environments: a case study in the Ozark Highland_, edited by W. Raymond Wood and R. Bruce McMillan, pp. 211-232. Academic Press, New York.

1976b The Pomme de Terre study locality: its setting. In _Prehistoric man and his environments: a case study in the Ozark Highland_, edited by W. Raymond Wood and R. Bruce McMillan, pp. 13-44. Academic Press, New York.

Moxom, Walter J.

1941 Climate of Missouri. In _Climate and man: yearbook of agriculture 1941_, pp. 945-954. U.S. Department of Agriculture, Washington, D.C.

Phillips, Jan

1979 _Wild edibles of Missouri_. The Missouri Department of Conservation, Jefferson City.

Rafferty, Milton D.

1980 _The Ozarks: land and life_. The University of Oklahoma Press, Norman.

Roper, Donna C.

1977 Cultural resources survey, Harry S. Truman Dam and Reservoir Project, Vol. IV, the archeological survey. Report to the U.S. Army, Corps of Engineers, American Archaeology Division, University of Missouri-Columbia.

1979 Archaeological survey and settlement pattern models in central Illinois. _Midcontinental Journal of Archaeology Special Paper_ 2 and _Illinois State Museum Scientific Papers_ 16.

Ruhe, Robert V.

1975 _Geomorphology_. Houghton Mifflin Co., Boston.

Sandhaus, E. H. and John Skelton

1968 Magnitude and frequency of Missouri floods. Missouri Geological Survey and Water Resources, _Water Resources Report_ 23.

Schwartz, Charles W. and Elizabeth R. Schwartz

1959 _The wild mammals of Missouri_. The University of Missouri Press, Columbia.

Scrivner, C. L., J. C. Baker, and B. J. Miller
1966 Soils of Missouri: a guide to their identification and interpretation. University of Missouri Extension Division Circular 823.

Shelford, Victor E.
1963 The ecology of North America. The University of Illinois Press, Urbana.

Shumard, B. F.
1867 A geological report on the mineral land belonging to R. H. Melton, Esq. in Benton and Hickory Counties, Missouri. R. P. Studley, St. Louis.

Smith, Bruce D.
1974 Predator-prey relationships in the southeastern Ozarks — A.D. 1300. Human Ecology 2(1): 31-43.

U. S. Department of Agriculture - Soil Conservation Service
1980 Using soil surveys through interpretive maps.

U. S. Department of Commerce - Weather Bureau
1965 Decennial census of United States climate, Climatic summary of the United States, supplement for 1951 through 1960: Missouri. Climatography of the United States 86-19.

Vineyard, Jerry D. and Gerald L. Feder
1974 Springs of Missouri. Missouri Geological Survey and Water Resources, Rolla.

Ward, Ronald L. and Thomas L. Thompson
1977 Bedrock and surficial geology of the Harry S. Truman Reservoir area, west-central Missouri. Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. X, Environmental Study Papers, pp. 1-21. Report to the U. S. Army Corps of Engineers. American Archaeology Division, University of Missouri-Columbia.

Webb, T., III and Reid A. Bryson
1972 Late and post-glacial climatic change in the Northern Midwest, U.S.A.: quantitative estimates derived from fossil pollen spectra by multivariate statistical analysis. Quaternary Research 2(1): 70-115.

Weide, David L. and Margaret L. Weide
1973 Application of geomorphic data to archaeology: a comment. American Antiquity 38(4): 428-431.

Wendland, Wayne M.
1978 Holocene man in North America: the ecological setting and climatic background. Plains Anthropologist 23(82, Pt. 1): 273-287.

Wendland, W. M. and Reid Bryson
1974 Dating climatic episodes of the Holocene. Quaternary Research 4: 9-24.

CHAPTER 3

FIELD INVESTIGATIONS

by

Susan K. Goldberg

Introduction

The testing of archeological sites in and the partial mitigation of the effects of the Harry S. Truman Dam and Reservoir on them began in the summer of 1977. Both the scheduling and methodology of this phase of the archeological investigations were determined largely by five factors: (1) the scheduling of construction activities, including vegetation clearing and fluctuating water levels, as well as the actual construction of structures and roads; (2) the attempt to answer research questions posed at the end of the survey phase of investigations, as well as those formulated during successive phases of the archeological work; (3) the necessity of gathering data which would serve as a representative sample of the full range of prehistoric activities in the area; (4) the necessity to supplement data gathered from the 1428 sites recorded during the initial Stage 1 and Stage 2 surveys (cf. Roper 1977), as well as to monitor some of those sites; and (5) the addition of sites to the data base, as survey continued in Public Use Areas and another 10% of the permanent pool area. Although a set of sites (attachment to Scope of Work) had been identified prior to 1977 and recommended as a sample to be investigated further, the factors enumerated above, in some cases, altered mitigative strategies. The original sample had been chosen prematurely; it was representative of archeological domains that had been identified at an early stage of research. Subsequent investigations, however, yielded supplemental data which permitted refinement of the ultimate selection of sites to be tested and excavated. Site sampling was a continuous process borne both of an ever-increasing data base and of necessity.

Construction and Impoundment

Under the most desirable circumstances, archeological reconnaissance, testing, and excavation are used as aids in resource conservation during the planning stage of projects which have the potential for impacting cultural resources. Given enough time and input during the initial (36CFR800)

planning stages of the project, the archeologist can determine the combination of conservation strategies (e.g., avoidance, removal, protection) which will maximize the protection afforded to the archeological resources (see Schiffer and Gumerman 1977: 291-301). Archeological work has proceeded in the area impacted by the Truman Reservoir, but the majority of this work post-dated the planning stages of the construction. Thus, the archeology has been largely relegated to the position of the salvage of information rather than the true conservation of the resources.

The predetermined project plans for the dam and reservoir thus played a large part in the formulation of testing and excavation strategy. While a primary goal of the archeological investigations was to obtain a representative sample of all of the resources in the project area, the majority of the effort was used in sampling those areas which would feel the most immediate impact. Thus, testing was concentrated on, although not confined to, sites below the 710' elevation – in the permanent pool – and on those in Public Use Areas. Extensive excavations were confined to areas of direct impact, where they would be flooded or destroyed by construction activities. Several sites outside these areas of direct impact were tested to allow for conservation recommendations. For example, sites in Public Use Areas could feel indirect effects of the reservoir because of easier access and increased activity. However, because these sites would not be destroyed by water or construction, it was felt that recommendations for either avoidance or protection of these areas would be ultimately more conservative than removal of the deposits by archeological excavation.

The timing of the construction and impoundment of water not only affected the potentials and goals of the archeological work, but it also influenced the scheduling of such activities. Research which would normally have been sequential, such as resurvey, testing, and excavation, were often necessarily concurrent.

The threat of rising water levels was a major factor in determining the locus of investigations. Thus, during the two months of 1977 prior to the July 1 date of the preimpoundment of water to a 670' elevation, all work was directed toward those sites which were below an elevation of 680'. Similarly, all subsequent investigations were artifically stratified on the basis of elevation – literally an uphill fight all the way. In fact, some of the planned investigations were either foiled or cut short when the water rose more rapidly than expected.

Another scheduling exigency created by the construction process was in areas to be cleared of vegetation. Such clearing often destroyed shallow archeological deposits, altered the natural terrain, and heat-altered archeological materials, making it mandatory that investigations precede such work. Occasionally the clearing was beneficial to the archeological work in areas which had been purchased by the government, and thus, were no longer in cultivation. In these cases the clearing removed weeds which sometimes obscured surface scatters, thereby increasing visibility to allow relocation of sites, location of new sites, and delimitation of site boundaries.

Problem Orientation

While the explicit goal of any mitigation program is to preserve as much of the archeological record as possible, there are a variety of ways to fulfill this task. Current legislation mandates that the archeologist's efforts be directed toward preserving remains and information from significant resources for the future. Such an obligation demands the evaluation of a resource's value – both current and potential. Current archeological theory suggests that representative sampling, using a regional perspective, may be the best method for realizing these goals. However, there must be an overriding organizational framework from which to determine "representativeness" and "significance." It is argued and has been argued throughout the Truman investigations (cf. Roper and Wood 1975) that the most productive framework which can be used is an explicit problem orientation (see Schiffer and House 1977). By combining general archeological questions with those more specific to the study area, the research becomes directed and productive; current knowledge can be organized and processed; and areas needing further inquiry can be identified.

Much of the fieldwork performed under the present contracts was directed toward answering a set of problems. Roper (Chapter 1) has presented them in detail. Basically they are as follows: (1) developing the cultural chronology of, (2) discerning the settlement system in, and (3) explaining cultural stability in the area. With these as the framework for investigations, a set of requisite sampling domains were identifiable, enabling operationalization of the research design.

REPRESENTATIVE SAMPLING

Three major sampling domains of concern presented themselves as a result of the nature of human behavior, archeological formation processes, and previous archeological work in the area. Throughout various phases of the fieldwork attempts

were made to obtain samples from the full range of physiographic locations, temporal units, and prehistoric activity types.

Several natural physiographic divisions had been used in previous investigations (Roper 1977) in attempts to formulate a model of settlement patterns within the region. These divisions were found to be useful for describing many of the differences occurring in the prehistoric use of the area and could potentially contribute to an explanation of the archeological record. These divisions were retained for the present investigations, thus allowing further testing and refinement of the settlement pattern model. During various phases of testing and excavation, attempts were made to sample sites from (a) the two major physiographic zones – the Ozark Highland and the western Prairies; (b) the major drainages, as distinguished in the previous surveys as twenty-two different strata (Roper 1977); (c) varying topographic positions within a stream basin; and (d) varying positions relative to a variety of watersources.

Previous investigations in the area have provided a partial understanding of the archeological record; basic types of activities and a general chronological sequence have been identified. In attempts to refine these descriptions and explain the record, this basic framework will be used to organize the investigations. Some of the more ubiquitous tool forms can be used as temporal indicators and, thus, will be used to assure representative sampling of sites from several periods of occupation. Similarly, the sites in the reservoir have been <u>very</u> generally categorized on the basis of their purported function – open-air, shelter, and mound (Roper 1977). That division is retained in the present work. The emphasis in the past has been on investigating shelter and mound sites, so the present field work is almost exclusively at open-air sites. Analysis and interpretation, however, necessarily includes data from all three site types.

Use of a third major sampling domain is necessary as a result of natural processes which form the archeological record. Sedimentation serves to bury cultural materials and erosion tends to unearth and move them. Some locations and soil types allow for better preservation of both materials themselves and their spatial relationships than others. Cultural activity, such as plowing and construction may also affect prehistoric assemblages. The effects of all of these processes must be described and then accounted for if a representative sample of the original prehistoric activities is to be obtained.

SUPPLEMENTARY DATA FROM STAGE 1 AND 2 SITES

Before proceeding with choosing a sample of sites from the reservoir area to be more fully tested, additional information about the 1,428 sites from the Cultural Resources Survey was needed. First, there were a large number of sites which yielded no diagnostic artifacts during the initial surface collections. Without those tools, those sites could not be assigned to a temporal unit and were only minimally useful for diachronic settlement pattern studies. It was necessary to supplement the original survey data by means of continued surface monitoring. A different set of surface conditions (e.g., wetter, cultivated rather than fallow, etc.) might yield diagnostics where none were previously recovered.

The second type of data necessary to the formulation of a sampling design for extensive testing was some knowledge of the subsurface parameters of the sites. Only a few of the sites from the original surveys had been shovel tested. At the others, no information had been gathered about the extent or integrity of cultural materials below the surface. Late in the survey phase of investigations it became apparent that relatively few sites would extend below the plowzone because of the geomorphic processes which led to site formation. Since so few sites had been shovel tested and little geomorphological analysis had been done outside the Pomme de Terre River valley, no pattern of location of sites with integrity could be established. It became necessary to return to many of the originally located sites to determine if their deposits reached below the plow disturbance.

The resurvey of sites to obtain chronological and geomorphological information also allowed observation of changes occurring at the sites. The effects of differential surface conditions on factors such as debris density and site size could be monitored. Also, the effects of activities associated with construction and filling of the reservoir on site integrity could be evaluated.

The 1977 Investigations

At the beginning of the 1977 field season, knowledge of the archeological record was limited in two important respects. While over 1400 sites had been recorded during the Stage 1 and 2 surveys, information about most of them was limited to that gained from surface evaluations and collections. Little was known about the depth, extent, and integrity of the cultural deposits. A second limitation of archeological knowledge was in the chronology. Through previous decades of work in southwest Missouri, a relative chronology had been developed, based on projectile point styles and ceramic types. These chronologies incorporated only the most ubiquitous artifact forms and were anchored

to a temporal dimension by means of cross-dating with assemblages outside the region. Work at Rodgers Shelter in the past decade (Wood and McMillan 1976) did much to refine these chronologies through the use of radiocarbon dating. However, a major problem remained; Rodgers Shelter did not contain materials representative of the full range of human activities in the reservoir area – spatially, temporally, or stylistically. Collections from the original 1,428 sites contained projectile points which were potentially diagnostic, but which were not represented in existing chronologies. This problem was magnified by the fact that a large percent of the sites were probably occupied after the Hypsithermal – the very time period that is the least well understood at Rodgers Shelter.

The primary objective, then, of the 1977 field season was to supplement the existing information recovered during initial surface investigations by examining their subsurface deposits. The goal was to identify sites with the potential to yield additional chronological information. Without that temporal framework, surface collections and locational and environmental data were relatively meaningless. Refining a chronology to include previously untyped projectile point styles would enhance statements about surface collections datable only by the artifact types they contained.

It was clear that certain conditions had to be met by a site if it were to yield chronological information. First, its integrity must be preserved. Two aspects of site integrity most necessary for formulation of a chronology are that the original spatial relationship between artifacts be retained and that botanical remains be preserved for absolute dating. The second requirement is somewhat less stringent as thermoluminescence and archeomagnetic dating are often possible.

Post-depositional alterations of the site must therefore be minimal. Natural processes occur at most sites (e.g., frost heaving, erosion, bioturbation) and alter the deposits to some degree (cf. Wood and Johnson 1978). Archeologists can normally account and compensate for these N-transforms. However, human alteration can often effectively destroy the integrity of a site. Agricultural practices and construction work are the greatest culprits. It was mandatory to identify sites which had cultural deposits below the plowzone and which were largely undisturbed by other activity.

While not as necessary as integrity, two other conditions were sought as being favorable for developing a chronology – multicomponent sites which were stratified and sites with a large number and high density of tools, par-

ticularly projectile points and ceramics. Therefore, each site which was reinvestigated was judged on four counts: (1) undisturbed depth of deposits below the plowzone, (2) preservation of botanics and ceramics, (3) stratification, and (4) artifact density.

It was obvious that not all of the 1,400 plus sites could or should be tested. Sites to be reinvestigated were selected, at the beginning of the 1977 field season, on the basis of their placement in an environmental, physiographic, and cultural typology. The typology used a number of factors for organizing the sites. Many of the physiographic factors (e.g., stream rank of closest water sources and topographic position) have been used successfully in other regions (see Roper 1979; Farnsworth 1973; Williams et al. 1973) to model and explain prehistoric settlement patterns. Similarly, environmental zonation is known to play a large role in land use practices. A division into Prairie, Ozark Highland, and a transitional zone (Fig. 2.6) was used to categorize the present sample.

Cultural factors were also used to stratify the sample of sites. While a refined chronology did not exist for southwest Missouri, enough temporal indicators were known and were present to enable general stratification along this dimension. Sites were separated into two groups which, on the basis of previous archeological work in the area, would have cultural meaning – pre-Hypsithermal and post-Hypsithermal (or pre-Late Archaic and Late Archaic/Woodland). It was suggested from work at Rodgers Shelter (Wood and McMillan 1976) that environmental changes in the area at that time caused adaptational changes by its occupants – a situation which mirrored changes occurring throughout the eastern United States (cf. Winters 1974; Ford 1974).

The division into "early" and "late" sites was based on projectile point forms recovered during surface collections. The "early" category included Plainview, Dalton, Graham Cave, Jakie Stemmed, Big Sandy, Frio, Archaic lobed, and MacCorkle. The Late Archaic/Woodland group included Sedalia, Nebo Hill, Smith, Afton, Table Rock Stemmed, Etley, Cupp, Snyders, Rice Side-Notched, Langtry, Gary, other contracting stemmed, Scallorn, Triangular arrows, Young, and Kay's (1978) Category 31. Table A-3.1 indicates the frequency of each type on all sites from which projectile points were recovered in Stage 1 and 2 surveys.

Such a division into "early" and "late" sites was impossible on two sets of sites. Those which contained components of both time periods were included in both groups. Those which either contained no projectile points or only points of unknown cultural/temporal affiliation were retained as a separate analytic group. A sample of these "unknown" sites

was chosen for reinvestigation. In 1977 the field conditions had improved greatly from what they had been in the drought years of 1975 and 1976. It was hoped that resurveys of these sites would yield temporally diagnostic materials, thereby allowing temporal categorization of those "unknown" sites.

Another cultural factor used for categorizing the sites was type of site – open air, shelter, or mound. It was generally recognized that these types represented different, although not mutually exclusive, sets of human activity. Previous archeological work in the area was concentrated on shelter and mound sites where artifact densities were high and preservation was good. The 1977 testing program and subsequent investigations concentrated on open-air sites to broaden the knowledge of prehistoric activities.

The major purpose of devising the typology described above was to categorize sites into culturally meaningful groups to allow selection for reinvestigation of a representative sample of sites. Human behavior, being adaptive, is known to vary along many dimensions. So, while the short term goals of the 1977 field season were to better understand subsurface cultural deposits and to refine chronology, it was important to examine sites from the full range of spatial and temporal dimensions. This would allow us to test whether human activity was determined by and adapted to physiographic and environmental variability through time and across space.

TEMPORALLY "UNKNOWN" SITES

Resurveys were carried out on a selected portion of the sites for which there were no diagnostic materials. All "unknown" sites were separated into two groups: (1) those at 670' elevation or below, and (2) those above 670'. The July 1, 1977 date set for pre-impoundment of reservoir water dictated that efforts be confined to the lower eastern portion of the reservoir. These sites were then stratified on the basis of the watercourse strata used during Stage 2 survey (see Roper 1977). A 25% random sample was chosen from each stratum (Table A-3.2). A few sites which were unknown and at 670' or below were inadvertently left out of the sampling frame as they were in the higher, western part of the reservoir.

Resurvey was carried out on each site in two phases. The first consisted of a systematic surface investigation with passes across the entire site at 3 meter intervals. The sole purpose of this phase was to recover diagnostic material. If this first phase were successful, the second, or subsurface examination, was carried out. On a few sites this phase consisted of excavating test squares, 1 x 1 meter in size, in controlled 10 cm levels, screening all dirt

through a 1/4" mesh screen. This method quickly proved to be "overkill," in terms of time and person-power needed to recover very little information. It was decided that to determine the depth of a site below the plowzone a series of shovel tests would be more profitable, allowing greater areal coverage of each site and time to test more sites. Shovel test holes were approximately 50 cm in diameter. They were excavated in two levels, with all dirt trowel-sorted for cultural debris. The first level was excavated to the base of the plowzone. The second level was taken to at least 50 cm below ground surface. The shovel test holes were placed so as to sample any microterrain present at the site location. For instance if a site was on a terrace edge, the top, slope, and base of the terrace were all tested.

The results of the resurvey of temporally "unknown" sites are presented in Table A-3.3. Of the thirty sites resurveyed, fifteen (50%) yielded diagnostic projectile points. These sites were added to the group of post-Hypsithermal sites; none contained material from a period earlier than the Late Archaic.

It can be concluded from this first phase of the resurvey that while it is an analytic necessity to treat temporally unknown sites as a group, such categorization is probably relatively meaningless. The presence of projectile points may be indicative of a certain set of activities going on at a site. However, given that in over half of the sites where previously there were not points recovered, a second surface collection revealed points, the absence of that artifact class may be a product of collection biases rather than the assemblages themselves. For instance, site size, used as a measure of the extent of prehistoric activity, does not explain the occurrence of projectile points in the present sample. The average size of the sites where points were recovered was 4823 m^2. For sites still devoid of points after the resurvey, the average was 7,343 m^2, but drops to 3,598 m^2 if BE241 (44,800 m^2) is removed. Both sites with and without points represent some of the largest and smallest sites in the sample. So many factors, such as amateur collections, ground cover, precipitation, and sedimentation could explain projectile point absence that the group of "unknown" sites is probably not a prehistoric cultural reality. As an analytic unit, however, it must be retained, if only to identify this as a group of sites which needs further investigation for assigning them a temporal designation.

The results of the second phase of the resurvey were not as successful as the first except in providing valuable information about the nature of subsurface cultural deposits in the area. Of the ten sites where it was possible to gain

permission to shovel test (many fields had been planted), only three contained any cultural material below the plow zone. Only one of these, 23BE653, yielded enough material to make it worthy of further testing (see Vol. I, Part 3). Site 23BE183 was very small with an extremely low density of debris. At 23BE318 the material below the plow zone consisted of one flake very close to the base of plow disturbance. Additionally, that site was heavily dissected by erosion.

A pattern of archeological site formation and post-occupational deposition processes began to be recognized during these initial sub-surface tests. It became apparent that while post-Hypsithermal sites were located in a variety of topographic settings, ranging from the uplands to the modern floodplain, only those on the floodplain (T-O) and perhaps the first terrace (T-1b) had any depth. Cultural materials on the rest were either confined largely to the surface or had been redeposited to a depth of 30 cm or so by plowing. At this early stage of investigations it was postulated that this pattern was the direct result of alluvial processes; sites would be buried in or under sediments only when they were in an active floodplain and their depth would depend on alluvial sedimentation rates. Exactly which landforms could be expected to contain archeological deposits with depth and how pre-Hypsithermal assemblages were affected required further testing. Knowledge of the patterns of terrace formation and their relationship to archeological deposits was possible only after additional shovel testing, excavation, and geomorphological analyses.

POST-HYPSITHERMAL SITES

Of the sites located during the Stage 1 and 2 surveys where projectile points were recovered, 162 could be dated generally to the post-Hypsithermal period. Twelve other sites were presumed to date to this period by virtue of the fact that they were mounds or mound groups. Given such a large number of sites and the constraints of time (scheduling of pre-impoundment), it was clear that only part of this set could be reinvestigated.

For the purposes of obtaining a sample which would be both descriptively and analytically representative, the 162 sites were categorized according to their hydrological and typographic positions. A three dimensional typology was devised with each dimension representing an environmental factor which has potential for influencing settlement patterns: the rank of the closest major stream, the rank of the closest stream, and topographic position within the valley. Not only would that framework ensure a sample suitable for testing settlement patterns and land use, but would

also ensure that sub-surface investigations were carried out throughout the reservoir in a variety of types of locations.

The first dimension — rank of major stream — was based on the survey strata devised by Roper (1977) for the Stage 2 survey. The ranks of the major streams in the reservoir are as follows:

Stratum	Stream	Rank
I	Middle Pomme	9
II	Lower Pomme	9
III	Little Pomme	4
IV	Hogles Creek	4
V	Bear Creek	4
VI	Weaubleau Creek	4
VII	Sac River	9
VIII	Salt Creek	4
IX	Gallinnipper Creek	4
X	Upper Osage River	10
XI	Upper Middle Osage River	10
XII	Lower Middle Osage River	10
XIII	Lower Osage	10
XIV	Little Tebo Creek	4
XV	Lower Tebo Creek	5
XVI	Upper Tebo Creek	5
XVII	Lower South Grand	10
XVIII	Middle South Grand	10
XIX	Confluence Area	10
XX	Upper South Grand	10
XXI	Deepwater Creek	5
XXII	Coopers Creek	4

The second dimension — rank of the closest water source — was used as an indication of the placement of a site in relation to a river and its tributaries. For both this and the first measure the stream ranking system devised by Strahler (1964) was used. If a site were equidistant from two watercourses of different ranks, the higher order stream was used.

The third dimension — a measure of topographic position— was tabulated as a percentage of distance from the river's edge to the bluff base. Thus, if a site were located one-tenth of a mile from the river at a point where the distance from river to bluff base were one mile, distance would be recorded as 10%. If the total distance between river and bluff base were two miles, river/bluff location for a site one mile from the river would be recorded as 50%. Thus, a site at the bluff base would be recorded as 100% regardless of the actual linear distance between the river and the bluff. If a site were on the slope of the valley wall or completely

out of the valley, it was recorded as "upland." Such a proportion was used, rather than raw distance from the river in order to measure the relationship of a site to microzonation along a river. The distinctions which seemed relevant – river edge, bottomland, bluff base, and upland – could be made in this way.

Based on these three measures (see Table A-3.4), each site was categorized. The site typology is presented in Table A-3.5. On the first dimension, streams of rank 9 and 10 were combined, as were those of 4 and 5, to form two groups. The regimes and attributes of (and presumably therefore human activities at) streams of ninth and tenth order are not much different, nor are those of fourth and fifth order. However, there is a major difference between the two groups. The second dimension was similarly broken down, with streams of ranks 1, 2, and 3 combined, 4 and 5 combined, and 9 and 10 combined. The distances were broken down into the intervals of $\leq$ 25%, 26 to 75%, 76% to 100%, and uplands.

There is one dimension of potentially great significance which is not reflected in this typology. The major biotic provinces – Ozark highland, prairie, and a transitional zone between the two – have not been accounted for. Indirectly, however, this distinction is made and will be sampled. Because the eastern portion of the reservoir was to be inundated first, that part was the focus for archeological investigation in 1977. This artificial stratification effectively imposed a sampling of the major biotic variability – the Ozark Highland, first and the prairie region in subsequent field seasons, due to an elevation gradient.

There was no rigid sampling technique employed when choosing post-Hypsithermal sites to be reinvestigated. Two major criteria dictated the choice of sites. First, every effort was made to obtain a sample from all domains in the site typology (Table A-3.5). Pragmatics dictated that a second criterion – elevation – be considered in choosing the order of reinvestigation; for the most part, lowest sites were tested first and higher sites left for later. Thus, rather than using a straight percentage of each sampling domain, selected randomly, the sampling strategy was fashioned around the timetable of the rising waters. In the interest of time, if two or more post-Hypsithermal sites were relatively close to each other, all were tested. That strategy resulted in larger samples from some domains. The percentage of sites reinvestigated ranged from 0% in some of the upland domains, to 60.0% in the bottoms. This preliminary testing phase was terminated, not on the basis of a minimum sample having been obtained, but to allow time for more extensive testing at three sites before inundation.

The field techniques used at the post-Hypsithermal sites were identical to those at the unassigned sites. While in this group of sites the first phase (collection of diagnostics) was not as important as it had been on the unknown sites, the results of those resurveys suggested that a second surface collection on these would be profitable. More important, though, was the second, or sub-surface phase of the investigations. As before, shovel tests were employed to determine the depth of the site below the plowzone, the approximate sub-surface density of cultural materials, and the degree of integrity and preservation of remains. Some of the sites which were resurveyed early in the season, before the utility of shovel testing was realized, were tested with the more controlled 1x1 meter excavation units.

The results of the post-Hypsithermal testing program in in 1977 are presented in Table A-3.6. Of the 162 known post-Hypsithermal sites, eight had been identified as such and tested during the previous "unknown sites" resurvey (see Tables A-3.2 and A-3.5). Forty-two of the remaining sites were revisited. One other site, 23SR459, had been shovel tested during the initial survey and reinvestigation at this stage seemed unnecessary.

Two of the forty-two sites were not located and the relocation of two others was questionable. Relocation was often affected by two adverse conditions: (a) previously cultivated fields which had been abandoned reduced visibility of the surface and (b) original survey collection strategies sometimes entailed nearly total collection of surface materials, thereby leaving little trace of prehistoric activity.

Only six of those sites which were resurveyed and shovel tested had any cultural material below the zone of plow disturbance. These were: BE660, BE337, BE676, SR459, BE346/347, and HE346. The site BE653, still temporally unaffiliated, was added to this list of sites which had the potential for supplying data about chronology because of its integrity and preservation. On the basis of elevation these sites were ranked, with the lowest to be tested first. Limited testing was to be done at all seven sites to confirm the depth, density, and preservation of materials, as well as to identify any cultural and natural stratigraphy which might be present.

In 1977 we were able to test only four of the seven sites. One of the lowest (660') sites, BE346/347, became inaccessible shortly after the initial shovel testing. An unusually rainy summer flooded the surrounding fields and inundation by pre-impoundment waters occurred before the flood waters had receded. Two other sites, HE346 and SR459 at 700' and 720', respectively, were presumed to be safe from inundation and were left until 1978 in the interest of time.

Major efforts in 1977 were focused on the remaining four sites. Two of these, BE676 and BE653, were less than 1/4 mile from each other on a terrace of the South Grand River. Both were tested with three 1x1 meter squares. Based on these test excavations, the sites appeared to be very similar in several respects in addition to their proximity. Both had a fairly high lithic density, some preservation of pottery, charcoal, and bone (although minimal when compared to shelter sites), and soil stains indicating possible preservation of features. The two sites contained Scallorn arrowpoints, indicating a Late Woodland component. However, BE676 seemed to be the better of the two sites for its potential for refining chronology. In addition to its Late Woodland Scallorn and Rice Side-Notched points, it contained several other point types (including a large number of Langtry points). In addition to its high density of projectile points and other well-made tools, the cultural deposits extended to at least 70 cm below ground surface. The debris at 23BE653 was concentrated in the first 30 cm and ended at a depth of less than 50 cm. The excavations at BE653 and BE676 are detailed in Vol. I, Parts 3 and 4, respectively.

It appeared, then, that 23BE676 met most of the criteria established for a site which could potentially yield chronological information. It was still not clear from the limited testing whether or not the cultural materials were stratified. There seemed to be a fairly continuous distribution of debris from the surface to 70 cm. In 1977 too little was known about the exact temporal placement of contracting stemmed forms such as Langtry and Gary to make component assignments to the different excavation units based on the few projectile points recovered. Only more extensive excavations could supply the quantity of material, spatial control, and geomorphological data necessary for establishing the temporal relationship between forms assigned previously to the Late Woodland period and the contracting stemmed points. Such extensive excavations were undertaken at the site. It was hoped that additional point forms would be present, allowing for an expansion of the variability included in the chronology established at the site. Additionally, with the degree of preservation observed from the limited testing, the site promised to yield other types of information about the post-Hypsithermal occupations in the region. Hopefully data for faunal and vegetal exploitation and intra-site activities analyses could be retrieved.

Another site where materials were recovered below the plowzone was 23BE337, on the Pomme de Terre River. Five 1 x 1 meter test squares revealed that, like 23BE676, there was good depth to the cultural material (two meters in one area and at least one meter over most of the site), preservation of pottery and charcoal, and a fairly high density of debris. Site 23BE337, however, contained a large number of corner-

notched points of various forms (Afton-like) which were not present at 23BE676. It, like 23BE676, contained Scallorn and Rice-Side Notched points. It appeared that these conditions would be favorable for expanding a chronological sequence established at 23BE676. It would also provide the opportunity to investigate the differences between two sites which had somewhat different cultural inventories although both were presumably from the post-Hypsithermal period. Therefore, a large excavation block was opened at 23BE337. The results of those investigations are presented in Vol. I, Part 4.

The fourth site with subplowzone material was 23BE660. Two points had been collected during the resurvey of this site. One was clearly an Etley point, the other was a basal-notched form that somewhat resembled a Smith Basal-Notched (but in fact is now identified to the newly named class Truman Broad-Bladed). The presence of an Etley point and a possible Smith suggested the possibility that 23BE660 had a Late Archaic component. The original survey had collected Scallorn and Rice Side-Notched, among other points. It thus appeared that the site could have several temporally distinct components.

The site had been visited sufficiently early in the summer that field strategy still called for excavation of formal 1 x 1 m squares on sites where diagnostic points were collected. Accordingly, four 1 x 1 m squares were placed at various locations on the site. By good fortune, subplowzone deposits, including several possible features, were encountered and the excavations were expanded. The results are presented in Vol. I, Part 4.

While the major emphasis in 1977 was on open-air sites, it was clear that shelters and mounds could also provide valuable information for refining the chronology of the area. A mass of data existed from the shelters from early investigations (e.g., Chapman 1965) and still more was collected in 1976 (Novick and Cantley 1977). Similarly, many mounds and cairns had been excavated during the early Kaysinger Bluff Reservoir investigations (e.g., Wood 1961, 1967). The importance of using these data – particularly those from the mounds – was recognized and they were incorporated in the research design for the mitigation program (Roper 1977).

Twelve mounds and cairns had been identified during Stage 1 and 2 surveys (BE401, BE534, BE536, BE550, SR111, SR112, SR471, SR518, BE625, HE525, HE574, and BE666). Given their locations, high on ridges or bluff-tops, none were in danger of being inundated. Two groups of mounds, BE534 and BE536, were in a location which would probably attract recreating visitors once the reservoir was in operation. It was thus decided that these mounds should be tested not only

because of their potential for being looted, but also to aid in the analysis of materials from previously excavated tumuli. In many of those tumuli the relationship between individual bones and between burials and artifacts was unclear. Was such unclarity a product of prehistoric behavioral patterns or of excavation practices and lack of osteological expertise? This question could only be answered if better controlled excavations were done. Unfortunately, this question was never fully answered, as the two groups of mounds tested were not burial tumuli; they were mounds of limestone piled up at some time during the historic period.

HYPSITHERMAL AND PRE-HYPSITHERMAL SITES

The strategy for examination of Dalton, Early Archaic and Middle Archaic sites was of necessity somewhat different than was that for examination of the Late Archaic and Woodland sites. The main reason for this was that it was recognized at the inception that most sites having components of this age were buried in the Holocene alluvial terrace whose deposits were being recognized over an increasingly broad area of the drainage area within the Truman Reservoir.

Sites for testing were selected from a list of sites recorded during either Stage 1 or Stage 2 survey that had points that were originally identified as members of the types Dalton, Graham Cave, Hidden Valley Stemmed, Hardin Barbed, Jakie Stemmed, Big Sandy, St. Albans, MacCorkle, "Category A," LeCroy (Roper and Piontkowski 1977: 253-254). Although subsequent restudy led to the reclassification of some of these points and elimination of some of these classes (see Roper and Piontkowski 1979), the original classification allowed us, in 1977, to isolate those sites dating to the Hypsithermal or pre-Hypsithermal; the list with the original projectile point identifications is shown here as Table A-3.7. Like the testing of younger sites, testing of Archaic sites was also operated by first considering those sites at lower elevations, essentially those at the lower end of the Osage, South Grand, and Pomme de Terre rivers. Since there were few at low elevations, most at 680' AMSL were tested, including 23BE185, 23BE372, 23BE260, 23BE404, and 23BE434/23BE662 (determined to be the same site). Among sites at or below this elevation which were not selected for testing, three sites (23BE207, 23BE267, 23BE576) also yielded Late Archaic and/or Woodland remains and had already been tested and determined to have no cultural deposits below the plowzone. Indeed, all three were found to be on the T-2 terrace, a landform too old to contain buried cultural deposits.

Because it was expected and, in some cases, known that Archaic cultural deposits were buried, field procedure was varied. Testing, therefore, consisted of either the placement of up to four 1x1 or 1x2 m test units (1x2 m units being more adequate for excavation in deeper levels), or the

cutting of small three-sided trenches on a stream bank to examine cultural deposits. These tests are described by Joyer, et al., Vol. I, Part 3.

On all but one site, 23BE260, the excavations revealed very light debris densities and were terminated after the initial tests. At 23BE260, however, a backhoe trench dug to help determine the stratigraphy encountered an intensely burned feature, duly numbered as Feature 1 (sometimes known as THE Feature). Because of this rare occurrence and because debris density appeared to be somewhat higher than at other sites, a larger excavation was opened. This excavation is described by Joyer, et al. in Vol. I, Part 3.

The 1978 Investigations

Field investigations at the beginning of the 1978 season proceeded using a framework similar to that of the previous summer. While it would perhaps have been desirable to carry out more intensive investigations at some of the sites tested in 1977, the scheduling of inundation precluded further work in the lower elevations. The basic stratification of sites into post-Hypsithermal, early and unknown categories was retained for the purpose of field investigations of the higher sites in 1978. Not only did two of these categories have cultural relevance, but the 1977 fieldwork showed that because of the geomorphological processes which participated in site formation, this tripartite categorization was analytically useful. The early sites would tend to be buried and thus, their investigation would require a research design and techniques different from those used to evaluate post-Hypsithermal sites.

In addition to the sites recorded during the Stage 1 and 2 surveys, the mitigation program was expanded, particularly in the latter part of the 1978 field season, to include sites recorded in another ten percent of the reservoir. The inclusion of this sample into the design of the mitigation posed a problem only in so far as timing was concerned. The research design had been structured in such a way that each additional site could be placed into an analytic unit and thus, would provide an increased population for sampling. To overcome the problem of concurrency in the stages of field investigations an additional step was included in the initial survey stage procedures. Since it was recognized that the sub-surface integrity of a site's deposits would have great bearing on its potential for answering certain of the questions posed during the mitigation, shovel testing was routinely incorporated to determine the depth of the site below the plow zone. This eliminated the need to return to the sites to carry out what had become the first phase of the testing program.

TEMPORALLY "UNKNOWN" SITES

At the end of the Stage 1 and 2 surveys the majority of the 1428 recorded sites could not be assigned to a temporal unit because no diagnostic artifacts had been recovered. The 1977 resurvey of a portion of these "unknown" sites revealed that diagnostic materials could be found on these sites if a second surface collection was made. In fact, 50% of the "unknown" sites resurveyed in 1977 were temporally assignable after the resurvey. Since sites which are temporally unknown are of little utility in most types of archeological analysis and are difficult to assess for purposes of resource management, the resurvey of these "unknown" sites seemed profitable and was continued.

In 1977 a 25% sample was taken of all of the unknown sites between 670' and below. In 1978 the unknown sites between 680' and 710', inclusive, were listed (Table A-3.8) and a 25% sample was drawn. At least one site was chosen from each survey stratum which contained unknown sites from this elevation. An attempt was then made to relocate and survey thirty-eight sites of the 149 unknown sites in the sample.

Field techniques were identical to those used during the 1977 resurvey of temporally unaffiliated sites. First, a systematic surface inspection was made to locate diagnostic artifacts, and then shovel testing was employed to evaluate the condition of the site below the surface. Once again the goals were to be able to assign the site to a temporal unit and then to determine if materials were preserved and intact to some depth below the surface.

The results of these resurveys and tests are presented in Table A-3.9. The relocation of eight of the sites was either questionable or unsuccessful. In some cases the ground cover was so extensive that no surface material was visible. In other instances the initial survey collections had been so complete that no material could be found. In both of these situations the site loci were shovel tested, but no cultural debris was revealed.

The results of the first phase of resurveys at the twenty-nine sites which were located were less successful than similar collections during the previous summer. Diagnostic materials were found on only five sites (17.2%), while in 1977 50% of the sites yielded temporally diagnostic projectile points. An explanation for such disparity might be sought by pointing out the difference in elevation of the two summers' target populations; the 1977 sites were lower in absolute elevation. If indeed absolute elevation was a measure of a site's placement in relation to the river (i.e.,

floodplain, terrace, slope, uplands), we would expect that the 1977 population included more floodplain sites than the higher 1978 population. We might then attribute the number of projectile points recovered on a site to the site's placement and the effects of differential geomorphological processes. For instance, a site in the floodplains which is somewhat buried by alluvial soils might be expected to lose its projectile points through attrition to artifact collectors at a slower rate than would a higher, surface site where the entire assemblage is constantly visible.

Such an explanation appears to be unfounded. Although the absolute elevations of the 1977 sites are lower, the average of their heights above the river (as taken from Roper 1977) is 19 feet, while the average for the 1978 sites is 17.59 feet. If topographic position and concomitant geomorphic processes determined the occurrence of projectile points on a site, we might expect the sites with projectile points to be lower (or perhaps higher) than those without. In 1977 the elevations above the river of those sites with diagnostics were only slightly lower ($\overline{X}$ Elev(w/PJ)= 18.0) than those where no diagnostics were recovered ($\overline{X}$ Elev(w/o PJ) = 20.0). It appears then that difference in site elevation does not explain the lower success rate of finding diagnostic artifacts in 1978. Perhaps a better explanation is the difference in the field conditions encountered in the two years. In 1978 many fields which had been under cultivation the previous years had been abandoned. Not only did the ground cover often make site relocations impossible, but it also made surface conditions less than ideal for collections.

As was the case in the 1977 resurveys of temporally unaffiliated sites, nearly all of the projectile points recovered were assignable to the post-Hypsithermal period. The exception was at 23SR434 where a Dalton (350) point and a straight stemmed form (362) were collected. This pattern supports the one discerned from the original survey data; early sites tend to be under-represented in the sample obtained through surface collections, particularly in the non-upland areas of the reservoir.

The results of the second phase of the reinvestigations of unknown sites was fairly discouraging. Only two sites contained any cultural material below the zone of plow disturbance. One of these, 23HI271, had lithic debris to a depth of 45 cm below the surface. Unfortunately, none of the surface investigations at the site produced diagnostic material. It is recommended that this site be monitored in the attempt to locate materials which would allow its assignment to a temporal category. The other site, 23HI283, appears to be a buried site with very little surface expression.

Cultural material, including a biface, flakes, and charcoal, were found to a depth of 63 cm below the surface. The surface assemblage included a Rice Side-Notched dart point. Rather than continue immediately with more intensive investigations at 23HI283, the site was included with the group of post-Hypsithermal sites to be sampled from and investigated later. The site was not in danger of immediate inundation since it was at an elevation between 710' and 720'.

POST-HYPSITHERMAL SITES

The testing and excavation of post-Hypsithermal sites at the lower elevations in 1977 were not entirely adequate for developing a refined chronology of the full temporal range and certainly not across the entire spatial dimension represented in the reservoir area. The two major excavations were particularly useful for the information they yielded about specific components within the post-Hypsithermal occupation of the area. The Cootie Site, 23BE676, represented an extensive occupation of the contracting stemmed phase and of the later Rice Side-Notched - Scallorn phase. However, the preservation and stratigraphic separation were less than ideal for determining the precise relationship between these two components. The third Smith component at that site was barely sampled due to rising reservoir waters. The Terre Baby Site, 23BE337, contained a wider range of projectile point variability. Two major forms that were missing from the Cootie Site sequence were present at 23BE337, corner-notched and straight-stemmed classes. The stratigraphic relationship between artifacts there was clearer. However, a low tool density and poor preservation of botanical materials diminished the reliability of the chronological sequence developed from that site.

A major emphasis for the investigations of post-Hypsithermal sites in 1978 was to test the chronological sequence of point forms developed previously and to supplement these. Supplementary data were needed especially for the earlier part of the post-Hypsithermal — a period we presumed was represented by assemblages containing types such as Sedalia, Nebo Hill, Etley, and Smith points. Additionally, the relationship of assemblages containing types such as Cupp, Table Rock Stemmed, and Gary points to the other components was still unknown. Information about the post-Hypsithermal in the western portion of the reservoir was also needed.

The results of the 1977 sub-surface testing dictated the strategy of the sampling and reinvestigation of sites in 1978. It was found that the majority of the sites shovel tested were shallow, and therefore, almost entirely destroyed by plowing. It was absolutely necessary to find intact sites for purposes of chronology development, but it became apparent that these sites would be rare. While testing was

to be continued in the search for sites with integrity, it was mandatory that we devise a research design which would result in information from the surface sites which could be incorporated into future analyses. Surface assemblages could not be used reliably to refine chronology, but they represented the largest portion of the sites in the reservoir and could not be ignored.

Recent advances have been made in the use of surface collections as an alternative to excavation for purposes of determining intrasite activity and regional settlement patterns (see Lewarch 1979; Binford et al. 1970; Warren and Miskell 1981). Given the constraints of time and money on large mitigation projects and the fact that surface data are often the cheapest to collect, surface assemblages become an invaluable tool. They can be a reliable indicator of the structure of the subsurface deposits at the site and are always a sample of the cultural debris present in at least the site's upper portion. If sites are non-stratified, shallow, and highly disturbed, as many are in the Truman Reservoir area, surface collections are often the only available sample of prehistoric activities.

Two major problems must be accounted for if surface data are to be used with any degree of reliability. If they are to be used as an indicator of sub-surface structure and relationships of prehistoric activity at a site, it must be shown that minimal displacement has occurred, or the displacement must be measurable. Secondly, it must be shown that the surface assemblage represents a circumscribed unit of prehistoric behavior; it must be isolated from earlier and later components and should be spatially segregated.

Preliminary studies (Roper 1976; Lewarch 1979) indicate that the, literally, prime mover in displacement activity, agricultural practices, does not effect the surface distribution of material as much as might be expected; perhaps under one-half meter. The displacement problem becomes potentially important only when internal structuring of the site is at issue. It was the original intention during the 1978 field season to gather such systematic data on a sample of the sites. However, because all previous surface collections in the reservoir were unsystematic, in the sense that precise intrasite locational information was not recorded, post-depositional displacement was a mute point. Moreover, the primary goals of the mitigation program were to understand the chronology of the area and to describe the general settlement patterns. Detailed knowledge of intrasite variability was not mandatory for realizing those goals. Assemblages, consisting of co-occurrences of tool and debris types, and their location in respect to environmental parameters, were of primary importance — not the precise relationships of individual artifacts within a

site. In fact, those detailed structural data gathered at each site would be relatively meaningless without a more general cultural-historical framework.

The second problem encountered in using surface data — time and space circumscription — was a more critical issue. While it is tempting to treat each isolated surface scatter as if it were a cross-section of a single locus of prehistoric behavior, such an assumption may be invalid. It may very well be the case that such scatters do represent single occupations or the last occupation in a series at a particular location. However, there is evidence from formal analysis of surface remains and geomorphological studies that in much of the Truman area such a conclusion is too simplistic. At times during the past, it appears that alluviation was extremely slow and in other places did not occur at all. Thus, remains from repeated occupation at a single location are not stratified. In some places erosional processes have caused mixing of cultural material from different occupations, particularly along terrace edges. Such mixing is evidenced by the co-occurrence of projectile points diagnostic of several time periods on a single land surface.

If each piece of cultural debris were as diagnostic of a cultural unit as projectile points, there would be no problem with mixing. However, at this stage of knowledge of the Truman area, we must depend on the few diagnostic artifacts in the collections as flags; we must assume that if projectile point types from different periods are found in a collection that the other materials are also mixed. While analyses of these collections can be instructive for some problems, such as locational dependent chert procurement and lithic useage, they are virtually useless for time-sensitive problems.

In an attempt to deal with this problem of multicomponent surface collections, the sites which contained some post-Hypsithermal material were divided into two categories, single component and multicomponent. This separation was made to distinguish between the research potential of each type of site. The single component sites would be useful in analyses even if their integrity had been somewhat destroyed. It was necessary only to confirm that they represented temporally and culturally restricted occupations. The multicomponent sites, on the other hand, would be useful only if their deposits remained intact and would be especially so if the components were stratified.

The definition of a single component site was a particularly difficult problem. The chronology of the area had not been refined enough during the 1977 investigations to enable fine distinctions within the general time frame.

It had begun to appear that there was some degree of continuity in some forms of artifacts. For instance, certain contracting stemmed points seemed to span the entire post-Hypsithermal period. Was it then valid to declare that a site was single component if it contained triangular arrow points and Langtry points? Similar problems arose even when the temporal dimension was not at issue. For instance, even if Etley and Smith points were contemporaneous, did they represent different cultural units? Since these were some of the very questions we were asking, it seemed appropriate to adopt the most conservative definition of a single component site – a collection from any locus which included only one of the known point types.

Admittedly, there were problems with that definition. The greatest problem was that it was based on a form of negative evidence; a site which might really have been multicomponent would be assigned to the single component class if we located only part of its projectile point inventory. In such cases where additional points were found, however, a site could always be reassigned. Similarly, a site which contained two or more point types was not necessarily used at more than one time or by more than one group. Until precise chronological data were available, however, we adopted this very conservative approach. The important thing to remember, here, is that the class assignments were made for analytical purposes – not as definitive statements about the behavior of the site's occupants. The major goal was to set up a research design based on the smallest cultural units we could devise. If a representative sample of the full range of these single component sites could be examined, these smallest units could be used to explain the sites where several of the units occurred together.

SINGLE COMPONENT SITES

Concurrent with efforts to locate sites which would yield chronological sequencing, a research design which incorporated single component sites was formulated. Once the variability across the temporal dimension was described, it would be necessary to evaluate each node in the cultural-historic network and to describe spatial variability during each period. This evaluation could be made in a variety of ways, but absolutely required the identification of single cultural components. It was clear that individual components at the multicomponent sites would not be easily distinguishable. The single component sites appeared to be the best analytic units for the description of individual nodes in the culture history of the area. Due to their time/space circumscription, the requirement of site integrity could be relaxed; their surface assemblages could be utilized for descriptive and comparative purposes.

These single component sites were organized within a research frame that would ensure representation of a variety of culture/time units and spatial/environmental zones. Sites which contained a single type of post-Hypsithermal projectile point were categorized according to that point type and then by environmental and topographic zones. To allow for comparisons between the eastern Ozark Highlands and the western Prairies, each of the original survey strata were fit into the biome where they predominately fell. These strata which were in the central part of the region and cross-cut those two major zones were placed in a Transitional class (see Fig. 2.6). Within each of the environmental zones a distinction was made between bottomland sites and upland sites. The typology of all single component sites which resulted is presented in Table A-3.10.

From the typology a number of sites were selected randomly for reinvestigation. The goal was to obtain a sample of sites whose collections — either surface or subsurface — could be used to validly represent a variety of cultural units from a number of types of environmental settings. Therefore, one site from each domain in the typology was chosen. If that site were rejected for any reason during reinvestigation (e.g., was flooded, could not be relocated, contained additional point types, etc.) another site from the same domain was chosen. This sampling process continued until either a site whose collection could be used for analyses was located or all sites in the domain were rejected.

As can be seen from Table A-3.10, many of these single component sites had been resurveyed and shovel tested in 1977. While those resurveys included sites from many of the domains in the present typology, the 1977 sites were from the lower elevations. Many were flooded, and so were not included in the 1978 population to be randomly sampled. Several of the domains were empty sets and a few others contained only sites which had not been resurveyed in 1977 but were too low to be investigated in 1978 (e.g., Afton-Transitional-Bottoms).

The techniques for investigation of the single component sites in 1978 were similar to those used previously. First, a systematic surface reconnaissance was done to locate diagnostic artifacts. This step was especially important since any additional point types would indicate that the site was not single component and should be investigated as part of the multicomponent class. The second step consisted of shovel testing. We realized that although surface collections could be used for analysis of single component sites and sites with depth would be rare, there was no substitute for an intact site with preservation of tool and debris associations and of other material remains.

The third part of the resurvey entailed an evaluation of the site's potential for yielding information through intensive surface collection. Attributes of the site's surface condition which seemed important were debris density, ground cover, and degree of disturbance.

The results of the resurveys are presented in Tables A-3.11 and 3.12. By the end of the 1978 resurveys of sites of unknown temporal affiliation, 142 single component sites had been identified in the Truman Reservoir area. Twenty of those had been resurveyed and shovel tested in 1977. For the present evaluation of single component sites, fifty-seven of the remaining 122 sites were randomly selected. Ten of those could not be relocated; at eight the ground cover was 100% and the two others were inundated. One of the sites which was flooded had been resurveyed and shovel tested previously, as had six of the other sites. Those sites were not resurveyed again during this phase of investigations.

The systematic surface collections revealed additional point types at six of the sites – HE526, BE359, SR467, SR488, HI228, and BE283.

Additionally further investigation of the documentation of three sites revealed that they were not single component sites. Outline drawings of points from an amateur collection at HE116 showed that several point forms had been present at the site at one time. In 1975, site HI241 had been tested (Chomko 1977: 40). While a Gary point was the only form recovered during surface collections, others were found during excavation. On the basis of resurvey at BE215, it was determined that the site was actually part of a larger site which included BE214 and BE217. Several point types, including a Dalton form, were collected from BE214 and BE217 in addition to the Gary point from BE215. These nine sites with more than one point form were included in the multicomponent site class.

Of the sites which remained in the single component category, shovel testing revealed that only seven had depth to their deposits. Two of these, SR459 and SR479, had been shovel tested during the original 1975 survey and showed depth to 30 cm below the surface; their depth below plow zone seems to be minimal. The other five, BE445, HI283, BE331, HI280, and HE412, seemed potentially useful for discerning intrasite activities and variability for certain components within the post-Hypsithermal period through excavation.

During the Stage 3 transect survey of an additional 10% of the permanent pool area, two other single component sites were located which had depth below the plow zone.

Site BE397 had been previously recorded but had never been shovel tested until the Stage 3 survey. The other site, SR681, was a newly recorded site found in an area where dirt had been borrowed for bridge construction.

A decision was made to do further testing at only three of these nine single component sites. One site, HI280, was one of two representing Smith components (see Table A-3.12. The other, BE445, at an elevation of 670' was too low and wet for excavations.

The two Stage 3 sites, BE397 and SR681, were also tested. The rest were not excavated in the interest of time; excavation of multicomponent sites was a priority. Postponement of testing was justified by the fact that four of the sites represented components which had been previously sampled. Terre Baby Site (BE337) contained a Scallorn component and Cootie Site (BE676) contained a Rice Side-Notched and Scallorn component as well as an extensive Langtry component. Additionally, the Langtry and Rice Side-Notched components were represented by two of the sites being tested; BE397 and SR681, respectively. The only component not represented in previous excavations was the Snyders at BE331. That site, however, was at an elevation of 740' and would never be inundated permanently. The testing of BE397, SR681, and HI280 is presented fully in Vol. I, Part 3.

The single component sites with no intact deposits were evaluated for their potential for intensive surface collections. It was hoped that a sample from each domain in the site typology could be obtained in this manner. The surface conditions at most of the sites prohibited such investigations. The majority of the sites were in fields which had not been cultivated within at least a year. Very little cultural material was on the surface since plowing had ceased and that which was, was barely visible through a year's growth of weeds. The only solution would have been to plow the fields anew – a process ordinarily so destructive to an intact site. Had we been able to locate farmers willing to do the plowing (which we could not), the cost would have been prohibitive. Unfortunately, the plan was abandoned; the original survey collections would have to be used for comparative analysis.

MULTICOMPONENT SITES

Although several multicomponent sites had been excavated in 1977, chronology refinement remained a critical issue. The majority of time and effort of the excavation crews in 1978 was spent investigating multicomponent sites. In fact, an attempt was made to relocate and shovel test every previously recorded site which contained two or more

projectile point types. Once again, the goal was to identify sites with two or more stratified occupations, a relatively high artifact density, and a good state of preservation.

While the single component sites discussed in the previous section were confined to the post-Hypsithermal period, the investigations of multicomponent sites were not. Such an analytic distinction was convenient when dealing with single occupations, but it is neither possible nor desirable when the goal is to locate stratified sequences of occupations which represent some time depth. Therefore, both the post-Hypsithermal and the earlier periods (investigated as a separate analytic unit and discussed as such in the next section) were the target of the present investigation.

The definition of a multicomponent site, as used here, is most certainly too inclusive. If a site has more than one point form, it does not necessarily represent more than one occupation. However, at this stage of investigations, that is exactly the problem we intend to solve; what types of tools and debris can be expected to co-occur at various time periods in different places? Until we have answered that, our analytic units will be gross approximations. We must assume that two different point forms represent independent cultural units of some sort, until we can show, for example, that those two forms represent stylistic or functional differences within a single occupation.

There were seventy-seven sites which, by the end of the 1978 single component resurveys, were known to have at least two projectile point forms. The majority of them contained only points assignable to the post-Hypsithermal period. Only three had points assignable only to the Dalton through Middle Archaic periods (see Table A-3.13). Twenty-one of the sites had been investigated and at least shovel tested previously. An attempt was made to relocate and test the remaining fifty-six sites.

The investigations consisted of site relocation, surface collection, and shovel testing. By far the most important phase was the sub-surface testing since multicomponent sites with little integrity remaining would be difficult to analyze. The surface collections were less important, but were carried out to gather additional information about artifact co-occurrences. The surface was fairly unsystematically inspected and diagnostic artifacts were collected.

The results of the resurveys and testing are presented in Table A-3.13. Of the fifty-six attempted site relocations fourteen were unsuccessful. Nine sites had been inundated by the reservoir prior to our resurvey. Five others could

not be found again because of either 100% ground cover or the fact that a total collection strategy had been used during the initial survey.

Discounting the several multicomponent sites which had been tested in 1977, there were only six in the present sample which had sub-plow zone deposits. Of the sites excavated prior to 1978, there was one, BE214 (which was later combined with BE215 and BE217; each was a separate area of a single site), where only one area of the site had been tested. Also, there was a multicomponent site having depth that was discovered during Stage 3 survey – BE681. These eight sites represented the total sample of known sites with potential for yielding additional chronological information (Table A-3.14).

Five of these sites were excavated in 1978 (Vol. I, Parts 2 and 3). Three of them appeared to represent predominantly the post-Hypsithermal period. Site BE681 was the only one with pottery, indicating the potential for preservation of other kinds of materials. The other two, BE319 and BE204, had many of the same projectile point forms as had Cootie (BE676) and Terre Baby (BE337) sites. However, BE319 had a different combination of points; the corner-notched forms so prevalent at BE337 and the contracting stemmed forms at BE676 were both present. Site BE204 contained a wide diversity of point forms, including several not found previously in excavated context.

The other two multicomponent sites excavated in 1978 appeared to represent, at least partially, the earlier occupations in the reservoir area. Both BE214 and SR189 had Dalton points, on the surface at SR189 and from excavated context at BE214. The surface collection from SR189 had included perhaps the densest assemblage of Middle and Early Archaic materials of any site located during the Cultural Resource Survey. Excavation at these two sites would hopefully increase our knowledge about the earlier periods. Full descriptions of the excavations at BE214 and SR189 are in Vol. I, Part 3. Previous testing at BE214 is described by Chomko (1977).

Site SR189 had an additional attraction for investigation. In July 1977, Roper had been contacted by Sandra L. Rayl of the National Reservoir Inundation Studies Project about the possibility of participating in that project's experimental program. Rayl, therefore, visited the Truman field camp in August 1977. After viewing a number of sites and lengthy discussion of the goals of the Inundation Studies Project, the kinds of experiments which might be performed at the various reservoirs throughout the country, and the potential of Truman Reservoir to help in those experiments, it was

decided to set up an experiment to monitor the impact of inundation on surface distributions.

Site SR189 was chosen for the experiment. In many ways, it was an ideal site for these purposes. It covers roughly 3 m of relief – nearly 2 m of which will be under water at permanent pool. It was fairly barren of ground cover in 1978 and had a relatively high debris density. The site was also well away from the nearest road; ease of access, while not impossible, was not simple either and in any event, it was unlikely that anyone but the farmer who cultivated the adjacent field and the archeologists would visit the site. The inundation experiment was therefore set in July 1978 and is described in detail in Vol. I, Part 3.

The three other multicomponent sites which appeared to have some depth, BE472, SR550, and HE346, were not excavated in 1978. Two of them, BE472 and SR550, were at elevations of 760' and 770', respectively, and were not in danger of being flooded. Site BE472 would be excavated in 1979; SR550, was in a wooded area, and the cultural deposits were riddled with mature roots. That site was never excavated. The third site, HE346, unfortunately, was the victim of over-ambitious clear-cutters. In the process of removing trees from nearby areas, bulldozers gouged the site well below the plowzone. The site's previously intact deposits were effectively destroyed.

PRE-HYPSITHERMAL AND HYPSITHERMAL SITES

The approach to pre-Hypsithermal and Hypsithermal age sites changed for the 1978 field season. Certainly more than one site had been found to contain materials of this age in surface context with later materials on higher terraces. The crucial logistic difference, therefore, was in preservation context, i.e., buried sites as opposed to surface sites. All but a handful of the 1428 sites recorded during the Cultural Resources Survey (Roper 1977) had a surface expression; the few buried sites had all been fortuitously exposed in stream banks (e.g., Piontkowski 1977). Thus, while it was known that buried cultural resources were present and that most of them were likely to be Middle Archaic in age or older, the extent of such resources was not known. Clearly, investigation of the chronology and settlement systems of the Dalton, Early, and Middle Archaic inhabitants of the central Osage Basin would depend upon a better sample of buried sites.

Accordingly, testing for buried sites in areas identified as T-1b, the Holocene age terrace, was carried out in the summer of 1978. The rationale, procedures, sampling strategy, and results of this program are described by Joyer in Vol. I, Part 2.

Two of the sites recorded during this survey, 23SR504 and 23SR675, yielded diagnostic or potentially diagnostic artifacts. Site 23SR675 additionally showed flecks of charcoal and burned earth, suggesting an *in situ* occupation. Site 23SR504 appeared to be stratified and contain at least three components. The two sites were about 150 m apart and had the added attraction of being directly across the Osage River from two buried early components identified and tested in 1976 (Piontkowski 1977). Therefore, larger test units were opened and hand excavated at each of these sites. The 23SR504 investigations are described by Tippitt (Vol. I); the 23SR675 excavations by Hanson and Goldberg (Vol. I). The tests at both sites confirmed the impressions gained from the backhoe survey. Since the excavations were performed late in the 1978 field season, the excavations were closed for the winter with plastic and straw to preserve the profiles, and it was intended to open larger areas in 1979. Unfortunately, reservoir impoundment with water rising faster than projected led to inundation sooner than expected and these plans were not realized.

The 1979 Investigations

By the summer of 1979 the Stage 3 transect survey of an additional ten percent of the permanent pool area had been completed and the 100 percent survey of Public Use Areas was well underway. A few of the sites which were located during the first part of the survey and which warranted testing had been examined in 1978 (e.g., BE681, BE397, etc.). However, there were additional sites located subsequent to the 1978 subsurface investigations that needed to be tested. Furthermore, since survey of the Public Use Areas was continuing through the summer of 1979, it was expected that additional sites that merited testing would be located.

The major charge then of the excavation crew in 1979 was to investigate sites from the Stage 3 transect and Public Use Area surveys. If time permitted, they would test some of the sites from earlier phases of investigations. Those were sites which had, in either 1977 or 1978, been recommended for testing but were at a sufficiently high elevation so that immediate testing was not mandatory; they would not be inundated.

The set of new sites to be reinvestigated was chosen on the basis of the results of the previous two summers of work. It was a well-known fact that conditions which favored the collection of a valid and meaningful controlled surface sample no longer existed in most of the reservoir area. The problem of abandoned fields encountered in 1978 had grown one year worse. The problem of surface disturbance also increased with widespread clearing and construction activities.

For these reasons, it was determined that productive investigations would be limited mainly to sites with depth where surface conditions mattered little.

Since all sites in the Stage 3 and Public Use Area surveys had been shovel tested during the initial field investigations, the potential depth of each was known. The set of all known sites with some depth below the plowzone was listed (Table A-3.15). Also listed were the sites recommended for testing during previous years. These sites were then rank-ordered on the basis of their research potential and elevation. Sites with potential for having intact remains to some depth that were the lowest in elevation were to be examined first in hopes that we would get to them before the reservoir waters did. As the elevation of the sample increased, priority was given to those sites containing diagnostic materials. As the Public Use Area survey continued, additional sites would be added to the list.

The results of the reinvestigation of these sites were less than promising. As can be seen in Table A-3.16, several of the sites had been almost totally destroyed prior to 1979. At several others, the portion of the site which had depth was below the reservoir waters. Another, SR256, could not be located due to a mapping error on the part of the original surveyors. On closer examination at the shelter site, SR709, it was determined that the chert debris was natural rather than cultural. Further testing seemed unwarranted at most of the sites which were relocated.

By mid-June after nine of the ranked sites had been resurveyed, a newly recorded site in the Cross Timbers Public Use Area required immediate investigation. The site, HI297, appeared to consist of three separate loci of activity. The depth of one locus was at least 30 cm and of another at least 60 cm. Debris and tool density was fairly high, considering that there was dense ground cover in the area. Although the site would not be inundated, it was slated for direct impact; a boat ramp was to cut through Locus I and camping facilities would be constructed across Locus II.

Several test squares were excavated in the two loci at HI297 which had been determined to have depth. Locus I on the first terrace of the Pomme de Terre River had only moderate debris density and appeared to consist of a single component. Locus II, just to the north of Locus I and on the second terrace, contained more extensive deposits. Debris and tool density was high and several occupations seemed to be represented. There appeared to be both vertical and horizontal stratification of the deposits. In both loci the preservation was good, with charcoal and some indication

that features were intact. Preservation of pottery in Locus II was the best encountered in an open site during three years of investigations.

Due to the site's potential for answering two types of questions and its imminent destruction, more intensive investigations were carried out. At Locus I, which would soon be destroyed by boat ramp construction, the plowzone was systematically stripped by mechanical means. In no previous investigation were we able to, or was it appropriate to, expose a large occupational area. Since the site would ultimately be destroyed and the degree of preservation was high, it afforded the opportunity to examine intrasite structure. If occupational features could be identified, it would allow for comparisons with components in regions outside the reservoir area which were known largely through their structural features such as house floors. Although not wholly successful, partially due to the type of machine used for stripping and the inexperience of the operator in such work, several features were exposed, mapped, and excavated.

While Locus II, with its greater artifact density and better preservation, may have been a more ideal target for the stripping operations, it was decided that the proposed impact (camping and picnicking areas) was not great enough to warrant such extensive archeological destruction. Moreover, its greatest potential assets for research seemed to be its stratification and high artifact density. For this reason, two small blocks were hand excavated in separate areas of the locus. As expected, it yielded the most useful information encountered thus far for testing chronological sequences. At least three components were present, as were large numbers of samples adequate for C-14 and thermoluminescence dating. All aspects of the testing, excavation, and stripping, as well as spatial and chronological information gained from HI297 are discussed in Vol. I, Part 3.

At one point during the investigations at HI297 rain forced us to move to higher ground. At that time, limited testing was carried out at BE472. It was a large multicomponent site which had a large diversity of tool forms and high surface debris density. Since it was in a Public Use Area, testing to determine the extent of the site below the surface was called for. Test squares on the crest of the ridge and on its slope showed that there are probably no undisturbed deposits at the site. There is no depth on the ridge crest. On the slope, the depth of the deposits is attributable to erosion induced by plowing. The testing is fully described in Vol. I.

References Cited

Binford, Lewis R., et al.
1970 Archaeology at Hatchery West. Society for American Archaeology Memoir 24.

Chapman, Carl H. (editor)
1965 Preliminary archaeological investigations in the Kaysinger Bluff Reservoir area, part II. Manuscript submitted to Region Two, National Park Service. University of Missouri-Columbia.

Chomko, Stephen A.
1979 Harry S. Truman Dam and Reservoir Project, the Cultural Resources Survey: Vol. VII. Archeological test excavations: 1975. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Farnsworth, Kenneth B.
1973 An archaeological survey of the Macoupin Valley. Illinois State Museum Reports of Investigations 26.

Ford, Richard I.
1974 Northeastern archeology: past and future directions. In Annual review of anthropology, Vol. 3, pp. 385-413. Annual Reviews, Inc., Palo Alto, California.

Kay, Marvin
1978 Stylistic study of chipped stone points. In Holocene adaptations with the lower Pomme de Terre River Valley, Missouri, edited by Marvin Kay, Ch. 8. Report to the U.S. Army, Corps of Engineers, Kansas City District. Illinois State Museum Society.

Lewarch, Dennis E.
1979 Controlled surface collection in regional analysis. In The Cannon Reservoir Human Ecology Project, edited by Michael J. O'Brien and Dennis E. Lewarch, pp. 42-51. Notebook No. 5, Division of Archaeological Research, The University of Nebraska-Lincoln.

Novick, Andrea and Charles E. Cantley
1977 Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. VIII: Archeological test excavations: 1976. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Piontkowski, Michael R.
1977 Preliminary archeological investigations at two Early Archaic sites: the Wolf Creek and Hand sites. Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. IX: Preliminary studies of Early and Middle Archaic components, pp. 1-57. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Roper, Donna C.
1976 Lateral displacement of artifacts due to plowing. _American Antiquity_ 41(3): 372-375.

1977 Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. IV: the archeological survey. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

1979 Archaeological survey and settlement pattern models in central Illinois. _Midcontinental Journal of Archaeology Special Paper_ No. 2, _Illinois State Museum Scientific Papers_ 16.

Roper, Donna C. and Michael R. Piontkowski
1977 Projectile points. Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. V: lithic and ceramic studies. Draft report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

1979 Projectile points. Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. V: lithic and ceramic studies. Final report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Roper, Donna C. and W. Raymond Wood
1975 Research design for the Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project: the archaeological survey. American Archaeology Division, University of Missouri-Columbia.

Schiffer, Michael B. and George J. Gumerman (editors)
1977 Conservation archaeology. Academic Press, New York.

Schiffer, Michael B. and John H. House
1977 Cultural resource management and archaeological research: the Cache project. Current Anthropology 18(1): 43-53.

Strahler, Arthur N.
1964 Geology: Pt. II. Quantitative geomorphology of drainage basins and channel networks. In Handbook of applied hydrology, edited by Ven Te Chow, pp. 39-76. McGraw-Hill, New York.

U. S. Government, Code of Federal Regulations
1979 36CFR800 - Procedures for the protection of historic and cultural properties.

Warren, Robert E. and Tom Miskell
1981 Intersite variation in a bottomland locality: a case study in the southern Prairie Peninsula. In Plowzone archeology: contributions to theory and technique, edited by Michael J. O'Brien and Dennis E. Lewarch, pp. 119-150. Vanderbilt University Publications in Anthropology 27.

Williams, Leonard, David Hurst Thomas, and Robert Bettinger
1973 Nations to numbers: Great Basin settlements as polythetic sets. In Research and theory in current archeology, edited by Charles L. Redman, pp. 215-238. John Wiley and Sons, New York.

Winters, Howard D.
1974 Introduction. In Indian Knoll, by William S. Webb. University of Tennessee Press, Knoxville.

Wood, W. Raymond
1961 The Pomme de Terre Reservoir in western Missouri prehistory. The Missouri Archaeologist 23: 1-131.

1967 The Fristoe Burial Complex of southwestern Missouri. The Missouri Archaeologist 29: 1-128.

Wood, W. Raymond and Donald L. Johnson
1978 A survey of disturbance processes in archaeological site formation. In Advances in archaeological method and theory, Vol. I, edited by Michael B. Schiffer, pp. 315-381. Academic Press, New York.

Wood, W. Raymond and R. Bruce McMillan (editors)
1976 Prehistoric man and his environments: a case study in the Ozark Highland. Academic Press, New York.

CHAPTER 4

LABORATORY ANALYSIS

by

Donna C. Roper

Basic Strategy

The laboratory analysis had three basic objectives: (1) to describe the results of the surveys, tests, and excavations performed in the field; (2) to describe and analyze the materials recovered during the field investigations; and (3) to integrate and synthesize the data to address the research objectives of the project. The entire report is the end product of this analysis; this chapter therefore merely describes the overall structure of the investigations and serves as a sort of "road map" to the following descriptive and synthetic chapters and reports.

Since the fieldwork was to be carried out over a period of three field seasons, would be supervised by a variety of people, and clearly would be reported by several persons, it was deemed advantageous to structure the analysis topically rather than by site. Although a single individual would be in charge of the reporting of the investigations at a particular site or group of sites, the collections from those sites would be analyzed topically by a different person or persons. That is, all ceramics were analyzed by one person, all lithics under the supervision of another person, and so forth. Raw material categories would then be described for all collections by the person or persons performing the analysis of each category and basic data for specific sites would be returned to the person reporting a specific set of field investigations. While this strategy does require reference to one or more subsequent volumes to provide basic criteria for artifact classifications, such inconvenience is vastly outweighed by the complete comparability of data across all sites and by the ability to reduce bulk and avoid repetition in individual survey and site reports.

1977-1978

The 1977 field season had concentrated on resurvey and testing of a relatively large sample of sites, and on

excavation of several of these that were at a low elevation. These investigations were largely organized into two broadly defined temporal classes – pre-Hypsithermal-Hypsithermal and post-Hypsithermal. The analysis was similarly organized. Pre-Hypsithermal-Hypsithermal sites had been resurveyed and tested by Michael R. Piontkowski who left the project at the end of the summer. Janet E. Joyer, who had been a member of the crew, therefore, was responsible for writing the descriptions of the investigations at those sites and for preparing the maps and profiles. Donna C. Roper was largely responsible at that time for the same at some of the post-Hypsithermal sites. These reports appear in this volume.

Raw materials were divided into several classes. Ceramics were studied by V. Ann Tippitt, projectile points by D. C. Roper, lithics by George P. Nicholas II and Margaret D. Mandeville, with the help of several laboratory assistants, and hematite by Margaret A. Van Ness who also served as laboratory coordinator. The lithics analyses were eventually incorporated into the analysis reported by M. Reagan in Vol. II; all other analyses are also reported in Volume II.

The field investigations and laboratory analyses of the recovered materials will in themselves provide a wealth of data bearing on the major themes of the project, as outlined in Chapter 1. A full interpretation of those data, however, is best gained by a holistic interpretation, placing the remains in the perspective of a wider understanding of the archeological remains in the reservoir. Clearly, an emphasis on river bottoms biases an interpretation of settlement systems and distorts the basis for evaluation of sites. Much of the 1960's archeology in the then Kaysinger Bluff Reservoir had been directed toward the very sites that the present investigations were biased against. It, therefore, seemed useful to reconsider and reinterpret data from some of these sites. Of major interest were the mounds excavated in the 1960's, the skeletal remains which could potentially inform us on the form of the populations buried in the area, on their nutritional status, on continuity or lack thereof in populations. The artifactual remains could potentially provide another set of data for chronological purposes and for the study of the problem of continuity. Therefore, in the fall of 1977, a re-analysis of the materials from the Fristoe (Wood 1967) and other (Wood n.d.) burial mounds was undertaken by Sharon L. Brock and Susan K. Goldberg, who were to analyze the skeletal remains and artifacts, respectively. Their analyses are summarized in Chapter 8 of this volume and are presented in full in Volume III.

An additional source of information, particularly for the study of settlement systems is a study of the settlement system of an ethnically continuous but documented society

adapted to the central Osage Basin. At Euro-American contact, the Osage tribe was living in three villages in what is now Vernon County and hunting throughout the Truman area. Archeological, historical, and ethnographic investigations in the 1950's by Carl H. Chapman (1959) had concluded that the Osage were the ethnic descendants of the prehistoric inhabitants of the Osage valley and the general four-state area of southwest Missouri, northwest Arkansas, northeast Oklahoma, and southeast Kansas. An ethnohistorical study of Osage subsistence-settlement systems was therefore deemed relevant to establishing a documented adaptation to the area. Such a study was undertaken by Lisa G. Carlson and is presented in Vol. III.

1978-1979

The 1978 field season had witnessed survey, including both surface survey and subsurface survey for sites buried in Holocene terraces. The temporal categories used in 1977 were no longer so rigidly adhered to for analysis, except that subsurface survey was in fact concerned largely with pre-Hypsithermal and Hypsithermal sites while surface surveyed and excavated sites were largely post-Hypsithermal. Reporting and analysis strategy was, however, identical to that used in 1977-1978. Surface survey had been coordinated by Roper, who became responsible for reporting its results. The subsurface survey was planned and executed by Janet E. Joyer, who then undertook the preparation of the report on that aspect of fieldwork. Test excavations had been coordinated by Goldberg who became responsible for reporting the results. In this, she was assisted by Tippitt, who had supervised one of the testing crews and became largely responsible for reporting the excavations performed under her supervision. The two survey reports are contained in Vol. I; also, the excavation reports are found in this volume. The report of the experiment for the National Reservoir Inundation Studies Project was also written by Roper. Since the funding for that project would be expired before the date of the Truman Report, it was submitted in draft form to the Inundation Studies Project in the fall of 1979.

Recovered artifacts continued to be studied by raw material classes. Ceramic and projectile point studies were continued by Tippitt and Roper, respectively. A major change, however, occurred in the structure of the lithic analysis. The 1977-1978 analysis had been supervised by a Research Assistant on a 50% appointment. Several laboratory assistants had also worked on the lithic analysis. The volume of material that was being recovered was great enough, however, that it became clear that such an approach was no longer viable. Michael J. Reagan was therefore added to the project staff on a full-time basis to direct a lithics laboratory.

The analysis was restructured, although it incorporated the work of Nicholas. Two research assistants, both working part time, and a varying number of laboratory technicians worked with Reagan. The emphasis in this analysis was not only on cataloging and descriptively analyzing stone tools but on collecting data in a format amenable to computer storage/retrieval and analysis. The SELGEM format used since the beginning of the survey in 1975 (Roper 1977: 65-68) was retained but expanded to accommodate the new data categories. Data entry operations were greatly expanded and were supervised by Carol V. Berg, who briefly describes the SELGEM structure and the Truman data storage/retrieval operation in the next chapter. The lithic analysis operations were also assisted by Margaret D. Mandeville, who initially worked out the classifications of the types represented in the collections, and by Jack H. Ray, who replicated tool forms and experimentally heat treated Truman Reservoir cherts to help better understand the prehistoric assemblages. Lithic analyses are presented in Volume II.

Throughout this period, other studies continued. Carlson continued her ethnohistoric study of Osage settlement and subsistence, and Brock and Goldberg continued their analysis of mortuary remains from Fristoe and other burial mounds. Roper researched the background and history of investigations in Truman Reservoir more thoroughly than before, ultimately presenting a synthetic summary of some of these data at the 1979 Plains Conference in Kansas City, Missouri (Roper 1979).

1979-1981

The 1979 field work had begun in March 1979 with survey in the public use areas. This final survey effort lasted for five months, the last three of which paralleled the final season of excavation. The basic analysis and reporting strategy established in 1977 was continued. Roper continued to be responsible for reporting the survey results, while Goldberg wrote the results of the excavations at 23BE472 and 23HI297.

Continuity in personnel also characterized the artifact analyses. The ceramic analysis, enlarged by the addition of a relatively sizable sample from 23HI297, was completed by V. Ann Tippitt. Roper continued the analysis of projectile points and was assisted by Goldberg in formulating and describing the categories finally used in Vol. II. Roper also described the hematite collected since 1977 and wrote the results of the analysis of all hematite described by herself and Van Ness (Vol. II).

Lithic analysis continued unabated throughout the summer of 1979 and into early 1980. With some lag time to

allow for data entry onto the computer, data correction, and entry into the SELGEM master file, subcatalogs from the complete file were being produced by the spring of 1980. An interface with SPSS had been built and analysis of collections data was possible. Analysis of the collected data therefore proceeded rapidly in early and mid-1980. The collections themselves were prepared for curation during this time.

In addition to the descriptive lithics analysis being performed by Reagan, several other topics in lithic analysis were also treated during this time. Jack H. Ray had surveyed the availability of chert in the field during the summer of 1979 and was therefore responsible for producing a description of chert resources as well as an analysis of actual chert utilization at a selected set of sites. Pamela J. Briney carried out experimental studies of wear-pattern production on Truman cherts, using tools replicated by Ray. Both Ray's and Briney's analyses are in Vol. II. Also in that volume is a study by Diane L. Solov of the assemblages present at eight Late Archaic sites. This study was independently undertaken on her own time by Solov and was submitted as a Senior Honors Thesis to the Department of Anthropology of the University of Missouri; it is included here as an example of the research potential of the Truman collection.

The best description of the Truman analyses will be found in the reports themselves. These reports could undoubtedly have been organized in one of several ways. It seemed most reasonable, however, to produce a first volume as essentially The Report of the Investigations, introducing the research design, the culture-historical and environmental background, the strategy of the investigations, and a synthesis of results. Subsequent volumes detail the fieldwork and topical analyses, providing the bulk of the data for the synthetic statements in Vol. I.

REFERENCES CITED

Chapman, Carl H.

1959 The origin of the Osage Indian tribe: an ethnographical, historical, and archaeological study. Unpublished Ph.D. dissertation, University of Michigan. University Microfilms, Ann Arbor.

Roper, Donna C.

1977 Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. 4: the archeological survey. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

1979 The Woodland period in the Ozarks: the concept, its history, and its place in prehistory. Paper presented at the 37th Plains Conference, Kansas City, Missouri.

Wood, W. Raymond

1967 The Fristoe Burial Complex of southwestern Missouri. The Missouri Archaeologist 29: 1-128.

n.d. Burial complexes in southwestern Missouri. Unpublished manuscript in possession of the author.

CHAPTER 5

COMPUTER DATA PROCESSING WITH SELGEM

by

Carol V. Berg

Introduction

In 1975 SELGEM, the Smithsonian's SELf-GEnerating Master series of COBOL programs was acquired by the American Archaeology Division at the University of Missouri. At that time, the Truman Reservoir project was beginning and it was anticipated that large amounts of data would ultimately be generated. It was therefore decided at that time to use the SELGEM system for data storage/retrieval. A simple catalogue of ten categories was begun (cf. Roper 1977) and was eventually expanded to include the more than twenty-five categories explained in the Lithics Laboratory Manual (Vol. II). The advantages of SELGEM were apparent. Large amounts of information could be accumulated, the contents of the file could be searched using English language words, and records could be readily added to or modified, according to the needs of the researcher, while maintaining maximum flexibility and integrity of the existing data.

There was a chronological, cumulative development of the system over the project including data definition, entry, maintenance and storage, creation, and correction of the Masterfiles, report writing and limited interface with SPSS and close monitoring of computer and operator costs of the system. The purpose of this discussion is to acquaint the reader with the system and its use on the Truman project.

SELGEM Overview

In order to understand and use the catalogues created in the Harry S. Truman Reservoir Project, one must have a generalized understanding of SELGEM. SELGEM is a cataloguing system for storage and retrieval of massive files of systematics data. It can be based on a unit record format, as are the Truman Reservoir files, or on a hierarchical format. The unit record is basically the equivalent of a single file card from a museum file which contains all the information about the particular item described:

> In a traditional catalogue, the catalog number serves to identify the specimen record to the curator. Similarly, in the SELGEM system, each entry is given a number called a serial number . . . Just as the catalogue number serves to identify the specimen to the curator, the serial number identifies the entry to the computer (Neuner 1976).

Serial numbers were arbitrarily assigned, generally in consecutive order, to artifacts as they were entered in the computer lab. A three-digit category number groups "kinds" of information, e.g., site number, state, provenience. This number facilitates searches for information in the catalogue. For example, if one wanted all the artifacts from a certain site, the computer would look only in category 010 for the information, rather than the entire catalogue.

An initial unit record for the earliest artifact catalogue would thus look like:

```
30099999400101 State
30099999400201 County
30099999401001 Site Number
30099999401501 Site Name
30099999402001 Excavated or Surface
30099999402101 Provenience (Horizontal)
30099999402201 Provenience (Vertical)
30099999405001 Artifact No. (if different from Serial No.)
30099999406001 General Artifact Type
30099999415001 Raw Material, Color
30099999420001 Number of Pieces
```

The three underlined numbers are the category numbers with their English translation in the date columns. The initial "300" is the catalogue number, a part of the serial number. A "300" or "301" in columns 1 to 3 indicates that the line is part of the artifact catalogue. The five character "99999" is the sequential SELGEM serial number, which is unique to a specific artifact or group of artifacts. It indicates that all lines with this number comprise the artifact's record. The next single-digit number, in column nine, is the transaction code which indicates the act to be performed on the line by the system. A "4" indicates that the line is to be added to the file, and a "3" changes the data in the masterfile to that which is bracketed by ampersands (&) in the transaction file record. A code "2" deletes the entire serial number and was used when there was an error in the serial number itself or in the case of duplicate entries. All unit records were entered in the transaction files which can be found on curated tapes as follows:

X03566 SELGEM Transaction file from 1975-May 1978
X05172 Backup of X03566
X03998 SELGEM Transaction file from May 1978-February 1980
X03999 Backup of X03998
X02864 SELGEM Transaction file from February 1980-May 1980 entered by Public Affairs Information Service
X00338 Backup of X02864

A list of the label numbers, dataset names, and a brief description of data can be found in the ON TAPE RECORD book, curated with the Truman Reservoir project files.

SELGEM consists of a series of programs that are used in sequence or individually. The central program is called SELUPD. It takes the raw data files (transaction files) and creates or updates a masterfile as specified by the transaction code contained in each input line. The program reads an existing masterfile on one tape, matches it with a sorted transaction file and performs the action specified by the transaction code, then writes the updated masterfile on another tape. This latter tape then becomes the current masterfile. This updating process was performed thirty-two times on the Truman artifact catalogue, with the final artifact masterfile having the dataset name "ARTMST32." It can be found on tape number X01957, with backup tapes X00503 (ARTMST31) and X01756 (ARTMST30). With the updating of a masterfile, there is produced an Update Report that lists sequencing errors, duplications, and transactions rejected for any reason. This report was used by the Computer Lab to locate any problems and to make corrections to the masterfile.

In addition to the updating and file correction functions found in SELUPD, there are also merging and report writing functions of the series of programs. SELMRG takes two sequenced masterfiles and creates a single sequenced file. SELLST is a formatted listing program that will print the masterfile, along with the category names, using one line per category or 25 lines per artifact in the Truman file. The SELLST program can, however, be restricted to a certain range of serial numbers, if desired. SELRPV is a flexible-format report program. Generally, once a format is established, it is maintained for future use since the formating process is time consuming and easily prone to error. SELEXT is a query program that searches the file for designated key words in the data section. It is capable of nested sorts, or querying several variables at a time, and then either outputing them in a Query Report or saving them on tape for further processing. SELKEY/SELKES is a series of two programs that work as one to sort the masterfile in any sequence by various words specified in the data. It outputs only to

tape with no actual report. The sequenced tape must then be read out using SELLST or SELRPV. The last, and frequently used, program was SELEPT, an Edit Frequency Report. This program would, for the categories designated, list each word which appeared in any entry in that category, the number of times it appeared, and the SELGEM series numbers in which it appeared. For example, a list of all sites in the catalogue, the number of entries per site, and the individual serial numbers bearing that site number could be attained by running SELEPT on category 010.

The most frequent use of these programs was in a series of PROCS, or predesignated procedures. One series was a query-report series in which the masterfile would be queried for a certain site (SELEXT), then the material would be sequenced according to provenience and general type (SELKEY/KES), and a report would be formated in an easy-to-read tabular format for output (SELRPV). The researcher could then examine the report, correct errors, and supply missing information when available. The corrections (see Correction Sheets in Appendix A) would then go to the Computer Lab for entry into transaction files to be submitted with the next update (SELUPD).

The most complex program series involved the creation of SPSS files. To create an SPSS deck from a SELGEM masterfile, the query program would first query out the desired site (SELEXT), sequence it as specified (SELKEY/KES), translate the unsequenced version from alpha-characters in the data to numerics (a PL/1 dictionary program), print a card-image format of the translated data using SELRPV to an on-line, interactive disk file, and then using SELRPV again to print separate catalogues for the sequenced and unsequenced files in tabular format for proofing and corrections. Corrections could then be made interactively to the SPSS deck, using the catalogue output. Corrections would also be made to the masterfile using Corrections Sheets (see Appendix A) for data entry and masterfile updating.

Physical Requirements and Development

Data entry from 1976-1977 was done interactively from two remote terminals, an IBM 2741 and a Decwriter, connected by acoustic coupler to the University IBM 370/168 computer. Two students were employed half-time for data entry which was done from single catalogue sheets, with a one unit per artifact format. Each line entered separately had to be prefixed by the fourteen-digit SELGEM number, which was repeated ten times per artifact. During this time, costs were low, and production was unavoidably low. It took from three days to one week to complete a 2,000 line dataset, or two hundred artifacts. The cost was less than $1,000 for the year. Data

was being stored in the raw form and maintained on disk and tape until the SELGEM system was able to process it. A total of around 65,000 lines was accumulated in this manner.

By August 1978, the first SELGEM masterfiles of the artifact and site catalogues were available, along with lists of artifacts and sites recorded. Soon the query program (SELEXT), resequencing program (SELKEY), and edit frequency report (SELEPT) were also available. These programs provided the means to actually look at the data on a site by site basis, usually organized by provenience and artifact type. This capability was not fully utilized until the fall of 1979 when the report writer (SELRPV) program was functional. The conventional format, a linear unit record (SELLST) did not lend itself well to proof-reading, or making general observations of the data. It was virtually impossible to locate missing items or blocks of information, or inconsistencies that became apparent when the data were rearranged in a tabular format and sequenced according to given categories. Typographical and data entry errors could also be spotted and corrected from the report writer sheet.

Once the SELGEM programs were functional, the main concerns were with report writing, SPSS interface, and upgrading data entry to increase efficiency.

With the initiation of a formal Lithics Laboratory in the fall of 1978, complete with training program, supervisors and twelve part-time workers, data entry was the largest immediate problem. Projected data generation over the next one-year period was over one million lines, or fifteen-times the total catalogue from the preceding three years. The Computer Lab expanded to add another terminal, a cathode ray tube (CRT), and exchanged the outdated IBM 2741 for a faster Xerox 1780. The three workers included two part-time operators and one full-time programmer/coordinator. Data entry had to be continually upgraded through better and more efficient use of the interactive TSO system, along with preprocessors and input programming using SAS (Statistical Analysis System). Output increased from about 2,000 lines per day to as much as 12,000 lines per day; 945,000 lines were entered during the 1978-79 year, just short of the one million line projection. Corrections, file maintenance, accessing data sets, tape storage, proofreading, file correction, and updating were a constant on-going process.

Cost

Cost increase over the five-year period was dramatic, increasing as system capabilities and efficiency increased:

Fiscal Year

July 1976 - June 1977	less than $1,000
July 1977 - June 1978	2,200
July 1978 - June 1979	8,300
July 1979 - June 1980	12,800
July 1980 - Sept. 1980	4,200

A breakdown of costs is exemplified over the first six months of 1979. Data entry and programming interactive time logged a total of 712 hours, with a cost of $3,231.74. Updating the file (SELUPD) cost $514.88, with an average update running between $25-40. Queries (SELEXT) cost $502.73, or around $15 each. One single list of the entire catalogue ran $334.00 in 1979. Other lists (SELLST), $484.15 total cost; edit frequency reports (SELEPT) $85.00; and resequencing (SELKEY) ran $30 for this time span. Programs were run as separate units, which was later eliminated as they were integrated into single series with more efficient JCL (Job Control Language). The single series eliminated logistical problems of writing to the same tapes, reduced abends and simplified program usage.

Lithics Lab work continued through 1979 into January 1980, with the Computer Lab remaining open through May 1980. An additional 370,000 lines of data were added to the masterfile during this time, along with the completion of the site catalogue masterfile as a separate entity produced by Cynthia Stiles-Hanson. The final statistics on the artifact catalogue were 1,375,013 lines, which included 120,996 records indicating at least that many artifacts recovered, since some sites were tabulated with more than one artifact per entry.

To use the catalogue to its fullest, an interface with SPSS was made functional. Terminology from the Lithics Laboratory Procedures Manual was coded into a translation program written in PL/1 to be compatible with the SELGEM system. Through this program, the English variables for all categories including artifact type, breakage, etc. were translated into numeric codes to be used in SPSS datasets. The series of programs mentioned earlier was set up to query a site from the masterfile, translate all alpha to numeric codes, write, via report writer, the numeric data to disk in SPSS card-image, 80-column format, then write out two plain text reports in a tabular format for checking and proofreading the site. When complete, the researcher would cross-check the data for missing values or incorrect translation, and then interactively make corrections on the SPSS decks. The clean data were then ready to utilize for statistical analysis. This procedure was used on around 100 survey sites.

Functional Applications and Use of Forms

CATALOGUE SHEETS (see Appendix) flowed from the Lithics Analysis Laboratory, filled out according to definition and standards set up and documented in the Lithics Laboratory Procedures Manual, to the Computer Laboratory. These sheets were organized according to site number, with no SELGEM serial numbers assigned. Serial numbers were consecutively assigned to each entry in the Computer Laboratory using SERIAL CONTROL SHEETS to avoid duplication of serial numbers. The sheets were then divided into datasets, or units of approximately 2,000 to 2,500 lines each, without special regard to site numbers. These datasets with assigned names were recorded in the DATA ENTRY LOG (see Appendix), along with the site numbers contained in the dataset and other pertinent information, including tape backup information and status as entered in the masterfile. The CATALOGUE SHEETS were entered via the interactive terminals either in unit records or by using data entry programs and methods. When a dataset was complete, a printout was obtained and proofread by the computer operator prior to the final backup on tape and entry into the masterfile. Errors were corrected and the transaction file was sent through the pre-processor, a PL/1 program developed by Public Affairs Information Service, a branch of the University of Missouri Department of Economics, to check the file for errors in format or for data exceptions, such as a non-numeric in a numeric field. These datasets remained on disk until they were backed up on two tapes, which included the archived tapes enumerated above. The dataset name and contents, along with the tape file number were listed in both the DATA ENTRY LOG and the ON TAPE RECORD, indicating that the processing of that dataset was complete and the dataset could be removed or deleted from disk.

When the datasets were copied from disk to tape, they were also run into the update program, SELUPD, to update the masterfile. The new masterfile was written to tape, leaving the previous two masterfiles as backups on separate tapes. Conceivably, a complete masterfile could be run from all the transaction file tapes, but this would have been unnecessarily expensive, both in CPU time and lines printed, since the update report lists all lines added to the masterfile.

Once the masterfile was completed, various maneuvers could be performed on it as explained in the "SELGEM Overview." The most common of these was listed on the SELGEM REQUEST FORM (see Appendix). This essentially served as a job ticket for logically ordering and resequencing various programming needs. It was filled out by the Programmer/Coordinator, then translated into the program series appropriate for that specific request. Job Control Language (JCL) would then be set up in a control (CNTL) dataset, usually bearing the name of the researcher. The program series could then be run and

would be backed up on tape with the suffix ".cntl." Once the processing was complete, the REQUEST FORM was filed according to date.

In order to maintain an awareness of computer activity and costs a COMPUTER ACCOUNTING FORM (see Appendix) was created. This allowed analysis and examination of daily costs and totals, along with time spent on-line, and programming costs. This was maintained throughout the project by all members of the Computer Laboratory with great consistency. Another extremely valuable tool was the COMPUTER LOG BOOK which was an ongoing journal kept primarily by the Coordinator and used as a reference and expression of various computer problems.

REFERENCES CITED

Neuner, A. M.
1976 SELGEM manual. Association of Systematics Collections. Meseraull Printing, Lawrence, Kansas.

Roper, Donna C.
1977 Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. 4: the archeological survey. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Other Useful References

Creighton, Reginald and James Crockett
1971 Smithsonian Institution Information Systems Innovations 2(22).

Creighton, Reginald and Penelope Packard
1974 Procedures in computer sciences 1(2). Smithsonian Information Systems Division.

Tuneski, Patricia
1978 SELGEM programs. Unpublished support documentation.

PART II.

FIELD SURVEYS, 1978-1979

NUMBER 1

SURFACE SURVEY

by

Donna C. Roper

PART II

CHAPTER 1

INTRODUCTION

At the conclusion of the Cultural Resources Survey of the Harry S. Truman Reservoir, a total of 54,445 acres had been surveyed. Of these, 38,246 had been surveyed during the 1975 general reconnaissance, termed Stage 1; the other 16,199 acres were surveyed in 1976 during a far more structured and intense survey, termed Stage 2. These surveys, however, covered only approximately 1/3 of the fee lands of the reservoir. A meeting held in Jefferson City, Missouri in December 1977 between representatives of the Corps of Engineers, the Missouri State Historic Preservation Office archeologist, and a University of Missouri archeologist agreed that additional survey should be undertaken on the reservoir lands. The "Proposed Harry S. Truman Reservoir Mitigation Plan" produced at that meeting called for, among other things, "continued intensive survey of areas below the normal pool and public use areas which have not been previously surveyed."

In accordance with this proviso, Modification P00001 was made to Contract DACW41-77-C-0132. The Scope-of-Work for this modification states that:

> Archeological survey shall be directed toward the multipurpose pool area and public use areas. Priority shall be given to maximizing survey in the multipurpose pool area with concentrated efforts directed toward the western portion of the reservoir as long as the area is above water.

These surveys were performed in 1978 (multipurpose pool or Stage 3 survey) and 1979 (public use area survey).

This report is the report of those surveys. It includes a description of the field techniques and structure of the survey, descriptive data on the sites located and on the conditions under which they were located, and a description of the collections made during the survey. Additionally, predictive models for site location and distribution in the Truman Reservoir are presented. This is done in two steps. The first is based entirely on the Stage 1 and 2 data and provides predictions (or projections) to be tested during

the Stage 3 and Public Use Area surveys. It uses data collected during Stages 1 and 2, and the chronology as understood at the conclusion of those surveys. It also goes well beyond the analysis of site locations presented in the Cultural Resources Survey report (Roper 1977: Ch. VII).

CHAPTER 2

PREDICTIVE MODELS

Predictive Models in Archeology

THE NATURE AND STATUS OF PREDICTIVE MODELS

The term "predictive model" has recently entered the jargon of archeology and is particularly prominent in cultural resources management. As the name implies, a predictive model is formulated to predict cultural resources in an area to be impacted by land modification, such as a reservoir, highway corridor, or powerline, or in a planning unit such as a river basin or metropolitan area. Models may predict occurrence of resources in general, or occurrence of resources of particular types. They may also be established in a variety of ways.

This merely states what a predictive model does, but does not establish such a model's status. To state what it does provides no help to an archeologist facing the task of constructing a predictive model. Since there seem to be no published definitions or critiques of predictive models in general, brief consideration is here given to what constitutes a predictive model, how one is formulated, and what is its status. To delineate the referent of a predictive model and how it will be used here, four terms are defined: (1) model, (2) prediction, (3) settlement pattern, and (4) settlement system.

Archeologists have been obsessed with models for a decade. The literature on models and model usage in archeology is now extensive, and the confusion is enormous. In the strict positivist sense, a model is a representation of a theory (e.g., Rudner 1966: 23-28, Braithwait 1960: 88-114). It often functions as an hueristic device, allowing a researcher to examine the inner workings of a theory, or to tinker with the theory using a more realistic or understandable representation of the theory (Rudner 1966: 25-26). However, in a discussion of models in archeology, Clarke (1972: 1-2) shifts the emphasis from a model as representative of a specific theory, to models as representative of general theory or as representative of methods for ordering observations. In this sense, a model might be basic statistics, central place theory, or the theory of factor analysis. In use, it is shoved against archeological reality (i.e., phenomena) to test the fit (Clarke 1972: 10).

Clarke (1972: 11-42) delineates 7 types of models, arranged in several higher level classes. Three of these seven types are of most concern to this discussion, viz., iconic, mathematical analogue, and system analogue models. All are classed as artificial (as opposed to real-world) abstract (as opposed to hardware) models. Any of them may be used for prediction. Briefly, an iconic model is a simple representation of data. Histograms, scattergrams, and maps are iconic models. A mathematical analogue model is one that uses some sort of equation or statistic to represent the data. Such models may be deterministic, statistical, or stochastic. Regression equations, factor analyses, and random walk models are all members of this class of models. System analogue models are those that in some manner represent the elements and interlinking of the elements in a system; they are concerned with modelling "the flow of consequences" (Clarke 1972: 29) between the parts of the model rather than with symbolizing the elements.

Prediction refers in a positivist sense to seeking an event implied by a set of lawlike statements and circumstances antecedent to or otherwise causally correlated with the event (Rudner 1966: 60). Prediction is the opposite of explanation, the subsuming of an event under a covering law, given a particular set of circumstances (Hempel 1966: 51). The logical difference between explanation and prediction is therefore one of temporal vantage point only (Rudner 1966: 60; Watson, LeBlanc, and Redman 1971: 5). In spite of this logical parity, however, many positivists hold that while an explanation could serve as a prediction, a prediction could not necessarily serve as an explanation since predictions may be derived from other sources (Morgan 1973: 263). These other sources of predictions could certainly be any of the three types of models described by Clarke. These models are not necessarily, in themselves, explanations of anything; rather, in many cases, they may well be iconic or mathematical representations of observations. It is clear, therefore, that predictive modelling in archeology relies on both the interpretation of models as used by Clarke, an interpretation that Binford (1977:5) regards as projections rather than as true predictions, and the broad, non-symmetrical-in-practice interpretation of the nature of prediction.

The definitions of settlement pattern and settlement system will be of considerable utility in understanding sources of predictive models. These definitions will follow the discussion presented by Roper (1979: 17-18).

Settlement patterns are understood as defined by Howard Winters (1969: 110): "the geographic and physiographic relationships of a contemporaneous group of sites within a

single culture." Geographic relations are understood to refer to those among sites ("man-man" relationships), while physiographic relationships are taken to refer to those between sites and features of the biophysical environment ("man-land" relationships). A subset of locational theory (i.e., a method) used in a specific case will usually emphasize one or the other, thereby determining the data collected and the techniques used to analyze them. A pattern is dependent upon the technique used in its description; thus, a variety of patterns may be recognized in the same body of phenomena. A settlement pattern is therefore a construct of the archeologist. Note then that the subset of locational theory that is employed may well be represented by statistics, random walk, etc. and may be said to result in a settlement pattern model.

A settlement system is a behavioral unit. Its referent is "the functional relationships among the sites contained within the settlement pattern" (Winters 1969: 110). As with any system, the settlement system possesses a set of components and the connections among them. Reconstruction of the system requires analysis of site contents, activity sets, assemblages, and a set of laws or law-like statements relating material objects to behavior. There is only one "correct" reconstruction of a system; hopefully more and more closely approximated by successive revisions of the model.

Settlement pattern and settlement system analyses can therefore usually be said to result in a model of the phenomena analyzed. Techniques normally employed in settlement pattern analysis will result in some kind of iconic or mathematical model, while modelling a settlement system should lead to a system model. A set of predictions (or projections) may then be derived from any of these models and tested against data.

Settlement pattern and settlement system models are, of course, built from observations on the archeological record, in the latter case, interpreted in the light of propositions about the relation between the archeological record and the human behavior that produced it (see Vol. I, Ch. 1 for further discussion). Both these kinds of models may, in fact, serve as sources of predictions. However, the emphasis in predictive modelling may be slightly different than many settlement system and some settlement pattern models may be suited for. In predictive modelling, the emphasis is likely to be on, for example, the density of cultural resources on the first terrace along major streams or on the occurrence of Mississippian sites on a given type of soil. Available settlement pattern studies may or may not give this kind of information. Additionally,

however, the predictive model should provide for such factors as alluviation, colluviation, pedoturbation, leaf-littering, humic build-up, and erosion that may serve to obscure, partly obliterate, or otherwise distort perceptions in the field. In other words, predictive models are concerned with where cultural resources are likely to be found and in what densities and perhaps what kinds of them. Settlement pattern models, however, may be concerned with the spacing of villages or their clustering around a water-source or any of a number of other kinds of things. Settlement pattern studies often perceive sites as points and examine the relations among these points and with the relation of points to their matrix; they are not concerned with the aggregate of cultural resources.

TYPES OF DATA FOR PREDICTIVE MODELS

Three major types of data are available for use in constructing predictive models: (1) hunches, (2) traditional survey data, and (3) sample data. Each is reviewed here in turn.

Hunch data are the weakest kind of data. Predictions of this kind are derived from a first-hand "feel" of where sites are located or from common lore about where sites are and where they are not. Such knowledge is often quite accurate about where certain kinds of sites are. The number of sites in places where there is supposedly nothing is truly staggering. It is assumed that no one seriously involved in archeological research will place major emphasis on this form of prediction.

Traditional data are here considered to be those data that derive from state survey files, general reconnaissance surveys, and any other type of non-probability survey. These data will vary in quality from almost useless to very good. Even the best, however, will contain an unknown bias. It will be unusual to know what areas were surveyed with negative results; if it is known, it probably will not be known how representative it is of an area.

The utility of traditional data should not be discounted, however. More rigorous tests of the models derived from such data do provide evidence that traditional data are biased (e.g., Mueller 1974), but that they also may provide quite credible models of settlement patterns (e.g., Fitting 1969; Roper 1979). If they are all that is available, as is often the case, they may be highly useful as initial formulations. The research design for predictive models for the St. Francis basin is an example of this strategy (Iroquois Research Institute 1978).

It may additionally be the case that few sites are known in an area to be surveyed. In such cases, reference to the literature in the general area may provide important clues for prediction.

The most precise predictions are, of course, likely to be those constructed from data derived from a probability sample survey. Such models do not guarantee the location of all types of resources. Flannery's (1976: 134) example of the 20% survey of the Teotihuacan Valley in Mexico that missed Teotihuacan itself is infamous; closer to home is the fact that the transect survey of Truman Reservoir never "found" Rodgers Shelter until late in 1978. The important point, however, is that there is only one Teotihuacan in the Teotihuacan Valley and there is only one Rodgers Shelter in Truman Reservoir. Other types of sites, whose occurrence is far more common, could be expected to be found in numbers proportional to their occurrence in the area surveyed. Densities and other parameters of the sites in the area could also be expected to be more accurately represented in a sample survey.

Two kinds of data may be derived from sample surveys. These are areal data and point data. By the first is meant that data, including presence, types, and/or length of sites in the area surveyed are gathered and used to predict various characteristics of the cultural resources. An example might be a case in which an area surveyed is divided into quadrats each of which is evaluated as to characteristics of topography, soil, water resources, vegetation, etc. and also for such characteristics as types, ages, sizes, etc. of sites recorded. Several of the Illinois predictive models studies used such an approach ([Benchley, et al. 1981; Thompson 1981] in both cases the investigators used traditional survey data in areas whose adequacy of coverage was not known. The important point for this discussion, however, is that it is the areal data kind of approach that is being discussed).

Point data are used in a sample survey in a manner similar to that used with traditional data. The difference is that relative proportions of sites of various types or sizes, or on various landforms, for example, will be meaningful. It may also be expected that the recorded sites will represent the types of sites to be found in the entire study area.

Beyond the nature of the data base, however, is the manner in which data are collected and analyzed. Any number of techniques may be used – each with most types of data. What is actually used will vary according to the quality of the data, the method of analysis (i.e., the implications

of the theoretical leanings of the researcher for the nature and kind of data to be collected), and perhaps the inclinations and skill of the researcher.

The simplest types of analyses are those that are descriptive. Univariate, bivariate, and some multivariate statistics are all of this nature. All in some manner describe the distributions and/or interrelationships of a set of variables. They even may or may not evaluate the probability of the relationship of a given strength occurring by chance.

Somewhat more complicated are those forms of statistical analysis that are predictive in nature. These would include regression and multiple regression with all its variants (including linear regression, curvilinear regression, polynominal equations, trend-surface analysis, and canonical correlation). Several such models have been attempted (e.g., Thompson 1981) — usually with poor results. The problem is not so much with the technique, however, as with the data. Unless the data were derived from a very well-controlled survey, use of regression predictions are likely to be of little value.

The most complex form of predictive model is likely to be that derived from simulations. In such models the variables important in settlement are represented, changed and otherwise manipulated to produce a series of logical consequences that may be tested by actual fieldwork and analysis. An excellent example is provided by Thomas' (1971) simulation of settlement in the Reese River Valley of Nevada. Such models do not necessarily produce expectations about the possibility of sites occurring at specific loci; rather they are more useful for predicting general densities, and kinds of places in which sites might occur.

Predictive Models for the Truman Reservoir

A predictive model for the Truman Reservoir is built using data from the Stage 1 and 2 surveys. The predictions, or projections, derived for testing with the Stage 3 and Public Use Area survey data are derived from relatively simple iconic models of site distributions in the Truman Reservoir. They are not derived from data summarized in the Cultural Resources Survey report for a variety of reasons, but basically because the level of knowledge of settlement system morphology in the western Ozarks does not yet warrant the application of techniques used in that analysis.

The basic purpose of the present analysis is to evaluate the distribution of resources across major physiographic

regions in the reservoir and their distributions within each region. However, since we know that there is variability of sites in terms of size and time of occupation, the distribution of various types of sites within regions is also evaluated. Elements of the present analysis therefore include:

1. the definition of physiographic areas within the reservoir;

2. the rankings of the stream valleys and a characterization of the drainage network;

3. a set of landform classes to which sites may be related;

4. characteristics of the total corpus of sites, including their size and temporal assignment; and

5. data on the extent of surveyed area within which the sites were recorded.

To each of these must also be added:

6. the geomorphic-archeological interaction that can be expected to hold in the river drainage.

DEFINITIONS OF PHYSIOGRAPHIC REGIONS

The Truman Reservoir vicinity spans two of the archeological-physiographic regions defined by Chapman (1975: 3), viz., the Western Prairie region and the Ozark Highland region (Lower Osage Locality) (Fig. 1). However, drawing these lines on a map is arbitrary; the line between the two is actually rather fuzzy. For purposes of this analysis, two transitional areas are defined between the two major regions. The areal extent of each of the four regions is defined using a combination of soils and geologic data (see Volume I, Chapter 2, Figures 2.7 and 2.8). They are delimited as groups of the survey strata used during Stage 2 survey (Roper 1977). Figure 2 shows the distribution of these four regions, mapped using combinations of the survey strata. The groups defined are as follows:

Group 1 – Ozark – Strata 1, 2, 3, 4, 5, 13, 14, 15, 17 – The bedrock of this area is comprised largely of Ordovician limestones and dolomites. Scattered remnants of Mississippian limestones occur on the highest interfluves. Ozark soils are present in the valleys; Ozark border soils are found on the highest parts of the interfluves. This area lies mostly on the Salem Plateau portion of the Ozark Highland as defined by physiographers (e.g., Hunt 1974).

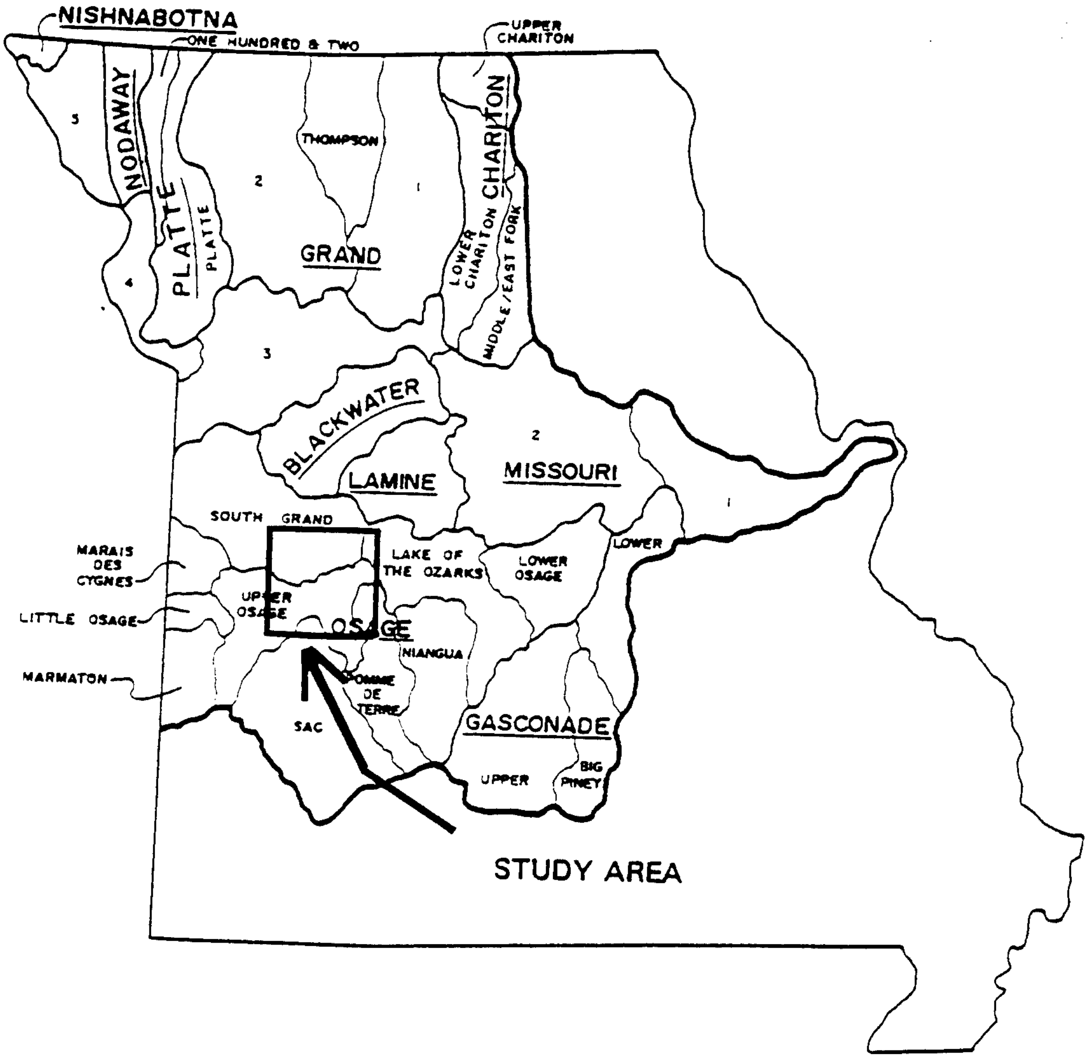


Figure 1. Relation of Truman Reservoir to archeologic/ physiographic regions of Missouri.

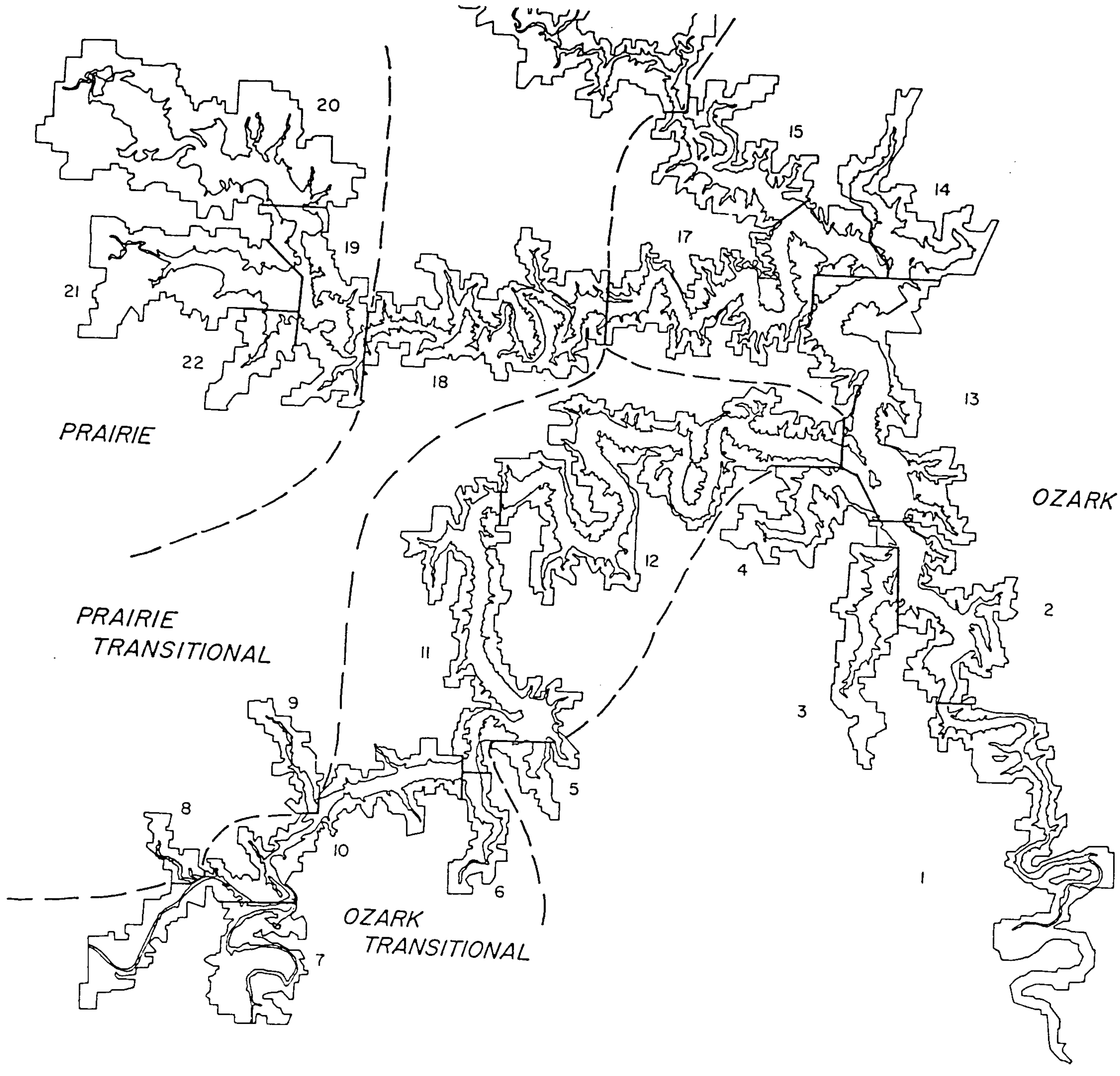


Figure 2. Physiographic regions used in this analysis.

Group 2 — Transitional, mainly Ozark — Strata 6, 7, 10, 11, 12 — Ordovician strata form the lowest portion of the valley walls, but only in the eastern part of this region. The Ordovician strata are overlain by Mississippian strata which form the valley walls in parts of the area. The highest upland interfluves are underlain by Pennsylvanian age sandstone and shales. Ozark soils generally occur in the valley, but take on Ozark border characteristics on the interfluves. This region is generally on the Springfield Plateau as defined physiographically (Bretz 1965: 11-12).

Group 3 — Transitional, mainly prairie — Strata 8, 9, 16, 18 — The bedrock of the valley walls is Mississippian, in some places overlain with Pennsylvanian formations, and with Pennsylvanian formations on the uplands. The soils are prairie soils, with some Ozark soils occurring in the bottoms of large streams in the eastern part of the area. This region is likewise on the Springfield Plateau.

Group 4 — Prairie — Strata 19, 20, 21, 22 — The valley walls and upland formations are all Pennsylvanian sandstones and shales. Soils in both valleys and uplands are prairie soils. This area is within the Osage Plains physiographic province (Hunt 1974: 326-237).

VALLEY RANK

All streams within the Truman Reservoir have been ranked, using the Strahler stream ranking technique (Strahler 1964; see Vol. I, Ch. 2 for details of stream ranking the the Truman Reservoir). In general, however, we recognize three magnitudes of valleys: those of streams ranked 1, 2, or 3; those of streams ranked 4 or 5; and those of streams ranked 9 or 10. Survey strata were defined around both 4-5 order stream valleys and 9-10 order stream valleys. Therefore, for analytic purposes we also define two groups of strata, grouped according to hydrological criteria:

Group A — Larger valleys — Strata 1, 2, 7, 10, 11, 12, 13, 17, 18, 19, 20 — These are the valleys of the Osage, S. Grand, Sac, and Pomme de Terre rivers, all ranked as 9 or 10.

Group B — Smaller valleys — Strata 3, 4, 5, 6, 8, 9, 14, 15, 16, 21, 22 — These are valleys of Deepwater, Cooper's, Tebo, Weaubleau, Bear, Salt, and Gallinnipper creeks, all of which were ranked 4 or 5.

Combination of physiographic region and valley rank class yields 8 region/rank groups, comprised of survey strata as listed in Table 1. These groups form the basis for much of the analysis of site distributions across space. Area within each group, expressed both in acres and as percent of total reservoir fee lands, is given in Table 2.

TABLE 1

Survey Strata Grouped by Physiographic Region and Valley Rank

Physiographic Group	Valley Rank Group A 9 - 10	Valley Rank Group B 4 - 5
1 - Ozark	1, 2, 13, 17	3, 4, 5, 14, 15
2 - Trn.-Ozark	7, 10, 11, 12	6
3 - Trn.-Prairie	18	8, 9, 16
4 - Prairie	19, 20	21, 22

TABLE 2

Areas (in acres) within Region/Rank Groups

Physiographic Group	Valley Rank Group A	Valley Rank Group B	Total
1 -	37,895.26 (22.91%)	22,392.72 (13.54%)	60,287.98 (36.44%)
2 -	42,728.38 (25.83%)	2,087.26 (1.26%)	44,815.64 (27.09%)
3 -	23,424.89 (14.16%)	2,632.01 (1.59%)	26,056.90 (15.75%)
4 -	22,906.02 (13.85%)	11,364.95 (6.87%)	34,270.94 (20.72%)
Total	126,954.55 (76.74%)	38,476.94 (23.26%)	165,431.49 (100.00%)

LANDFORMS

Within each region, sites are also related to landforms within each region. For descriptive purposes, valley components are defined following Butzer's (1976: 80) basic hillslope components (Fig. 3a). We therefore distinguish uplands, crest-slopes, mid-slopes, footslopes, and bottoms. In the latter, we distinguish terraces and terrace remnants. Floodplains are, of course, also present, but since they cannot be reliably differentiated on maps they are here undifferentiated in the analysis. This in fact will introduce little bias since the modern floodplain began to form late in the prehistoric period. Upland features sometimes used here include upland plains, knolls, and ridges (Fig. 3b).

DEFINITIONS OF CULTURAL COMPLEXES

The six cultural complexes to be used here are those delineated in the study of the projectile points collected during Stage 1 and 2 survey and are as defined in the Final Report (not the Draft Report) of the Cultural Resources Survey (Roper and Piontkowski 1979). The six complexes and their identifying characteristics are:

1. Dalton – Dalton and Plainview points
2. Early/Middle Archaic – bifurcated base, Rice Lanceolate, Hardin, small side-notched darts, Graham Cave-Big Sandy
3. Late Archaic – Afton, Smith, Stone Square Stemmed, Etley, Sedalia, Nebo Hill
4. Middle Woodland – Snyders group (Snyders, Cooper, Lander, etc.)
5. Woodland A – Gary, Langtry
6. Woodland B – Scallorn, other arrows, Rice Side-Notched.

Presence-absence of each of these complexes at each Stage 1 or 2 site with projectile points identifiable to one or more of these complexes is given in Table B-1, tables volume.

THE GEOMORPHIC INTERACTION

Any attempt at predicting even the occurrence of archeological sites, particularly those earlier than Late Archaic, must account for interaction with the alluvial regime of the river basin. The Quaternary history of a portion of the Pomme de Terre Valley has been carefully reconstructed (Haynes 1976). Happily, it is known to be generalizable in basic outline to the other major tributaries of the Truman Reservoir as well.

FIGURE NOT AVAILABLE

Figure 3. Landform definitions: a, basic hillslope components; b, upland topographic features.

The basic terrace sequence generalized from Haynes (1976: 49; 1977: 26), is schematized in Figure 4. Four terraces, plus the modern floodplain, are recognized. [Note: The two terraces labeled T-1a and T-1b were originally thought to be opposite side expressions of the same unit. Subsequent investigations showed they are separate units (see Haynes 1976: 55-57). Thus, the fourth terrace is referred to as T-3, the third as T-2, and the second and first as T-1a and T-1b, respectively.] Approximate periods of formation are given for each terrace, based on currently available dates. T-1b could therefore be expected to contain buried archeological remains. Sites of any age would be expected to be found on, rather than in, all higher terraces. The modern floodplain (T-0) could be expected to have only Late Woodland remains on or within its deposits.

Inasmuch, therefore, as T-1b spans nearly the entire Holocene, it is important to understand the basic outline of its depositional history in order to conclude what kinds of remains may be expected on the surface and what should almost surely be buried. Rodgers Shelter is the type locality for this unit (known informally as the Rodgers Alluvium or Rodgers Terrace). Its depositional history is schematized in Fig. 5. Values depicted represent Kay's (1978: 6) recalculations of rates originally reported by McMillan (1976: 213). Clearly all but the Late Archaic and Woodland components are deeply buried. To be sure, the sedimentation rates are valid only for the particular locus, but investigations at other loci, including those in valleys other than the Pomme de Terre, have revealed that sites earlier than Late Archaic are indeed contained within T-1b sediments (Piontkowski 1977, Collins, et al. 1977).

It is clear, therefore, that any attempts to predict the occurrence of archeological resources in the central Osage River basin in western Missouri must account for the dynamic nature of the geomorphology of the river bottoms. Adequate data are not available to predict the occurrence of buried resources beyond this general level.

The Occurrence of Cultural Resources

SITES, DENSITY, AND DISTRIBUTION WITH THE RESERVOIR

Predictions about the distribution and density of sites in the Harry S. Truman Reservoir are based on data collected during Stage 2 survey. This survey was designed to evaluate spatial differentials in site distribution within various parts of the reservoir and to provide estimates of the extent of the cultural resources in Truman Reservoir. It is described in full by Roper (1977: 70-74) and is here summarized only briefly.

FIGURE NOT AVAILABLE

Figure 4. Generalized terrace sequence.

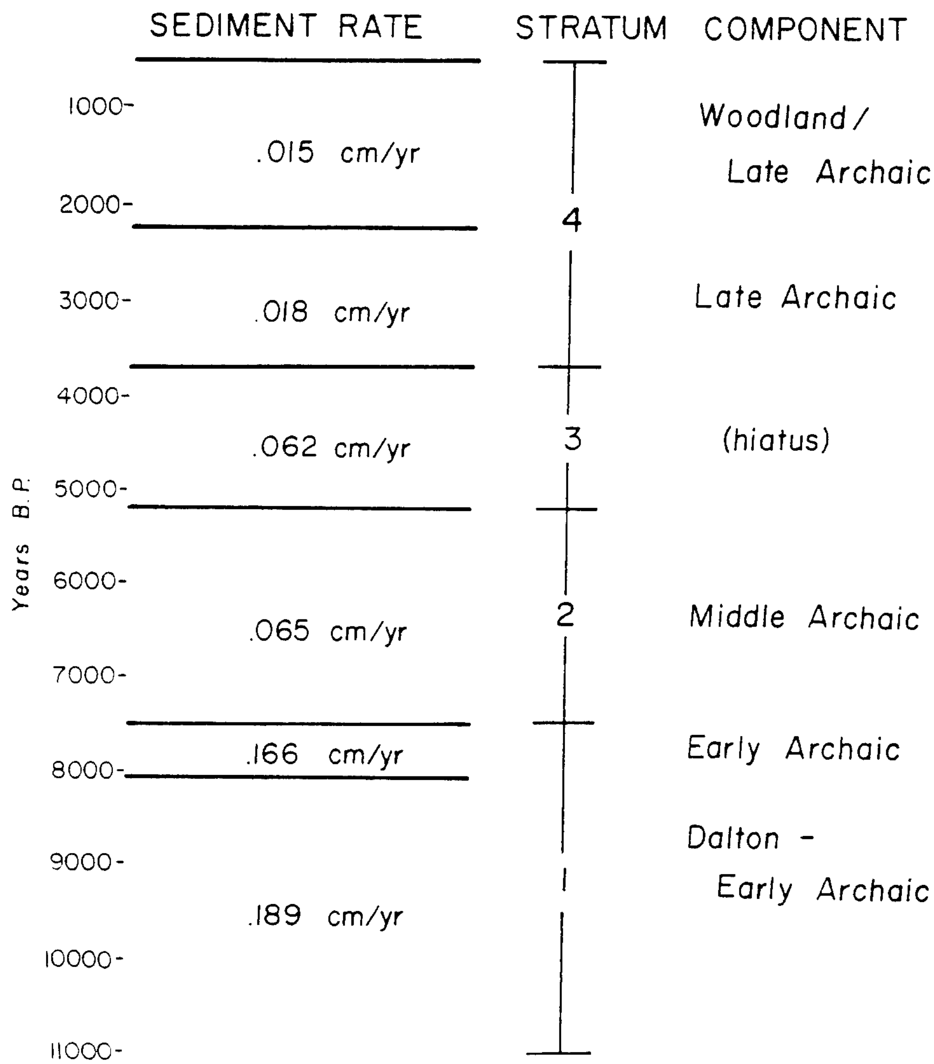


Figure 5. Rodgers alluvium sedimentation rates and cultural components at Rodgers Shelter (data from Kay 1978: 6).

The Stage 2 survey of the Truman Reservoir was implemented as a stratified random sample of the Corps fee lands. Twenty-two survey strata (Fig. 2) were demarcated, each defined by a major stream or stream segment. Within each of these, 1/8 mile wide transects were designated. Each transect ran from acquisition boundary to acquisition boundary in a direction roughly perpendicular to the stream, but in any case either n-s or e-w. The sampling fraction was set at 10%.

The Stage 2 survey actually surveyed 9.79% of the area to be acquired by the Corps of Engineers. Within this area, 476 sites were recorded (Roper 1977: 127-159). These 476 sites provide the data base for predictive statements about site density and distribution in general.

Table B-2(tables volume) summarizes the data on areas in strata, areas actually surveyed within strata, frequencies and densities of sites recorded. The present analysis is, however, conducted primarily in terms of the 4 physiographic regions previously described, and often by valley rank as well. Areas surveyed, expressed both in acres and as percent of area surveyed, frequencies, and densities of sites in each of these 8 region/rank classes are given in Table 3.

How well distributed sites are is evaluated in Table 4. In this analysis, X^2 is used to evaluate the goodness-of-fit of the distribution to a random expectation. Expected frequencies are derived from multiplying the total number of sites recorded (476) by the percentage of the surveyed area that fell within each category. The value of the chi-square suggests that sites are not randomly distributed within the 8 physiographic region/valley rank classes. (The + and - notations in the table, of course, have no place in a chi-square analysis. They are, however, useful for quickly denoting whether sites are overrepresented (+) or underrepresented (-) relative to expected frequencies.) The form of the departure from randomness is clear. Sites are quite underrepresented in the prairie areas of the upper S. Grand River drainage; they are overrepresented in smaller stream valleys and in the Ozarks in general. This could mean that settlement was more attractive in the smaller ranked streams and the Ozarks in general, but could just as well be reflective of at least two other factors. The first of these is surveyor bias. Some of the surveyors appeared to have been lumpers while others were splitters. While each stratum was surveyed by only a single crew, most of the 8 classes of strata include strata surveyed by a variety of crews. Nevertheless, the possibility remains that frequencies in some classes could be the product of splitters. It could also be the case that larger valleys have been subjected to greater degrees of alluviation and scouring which would tend to either bury or obliterate sites.

TABLE 3

Areas Surveyed and Site Densities, By Region/Rank Class

Region	Area Surveyed	% of Survey Area	No. of Sites	$Site/mi^2$
1A	3645.98	22.51	114	20.01
1B	2479.54	15.31	111	28.65
2A	4131.35	25.50	144	22.31
2B	283.38	1.75	21	47.43
3A	1597.44	9.86	37	14.82
3B	383.76	2.37	18	30.02
4A	2567.00	15.85	25	6.23
4B	1110.68	6.86	6	3.46
Total	16199.13	100.01	476	18.81

Data from Roper (1977: 75, 226)

TABLE 4

Goodness-of-fit to Random Distribution, All Sites by Region

	0	E	X^2
1A	114	107.15	+ .44
1B	111	72.88	+19.94
2A	144	121.38	+ 4.22
2B	21	8.33	+19.27
3A	37	46.93	- 2.10
3B	18	11.28	+ 4.00
4A	25	75.45	-33.73
4B	6	32.65	-21.76

$X^2 = 105.46$ DF = 7 $p < .001$

Size distributions were also examined for all 476 sites. Site size measurements can vary considerably among surveyors. Before using the site size figures in analysis, therefore, an analysis of variance was performed to evaluate the effect of individual surveyor's perceptions of size (Table B-3, tables volume. The F-ratio of 1.09 (DF = 4.34, p = .36) suggests that identity of surveyor will not drastically alter the measurement of the size of a site.

Table 5 presents the frequency distribution of sizes of the 439 sites (92.2%) for which data were available. Over 2/3 of the Stage 2 in-transect sites are less than 1/4 hectare in size, and almost 90% were measured as 1 hectare or less.

Table 6 presents means and standard deviations of site sizes in each of the physiographic area/valley rank classes. Not unexpectedly, in all but the prairie region, sites in the larger stream valleys (Pomme de Terre, Sac, Osage, and S. Grand Rivers) are considerably larger than those in smaller valleys. The form of differential distributions of site sizes within each region is shown by histograms in Figure 6. These histograms graph percentages rather than absolute frequencies. Of the 48 sites measured at greater than one hectare, 28 (58.3%) are in the larger stream valleys in the Ozarks or Transitional, primarily Ozarks areas.

The foregoing analysis analyzed the distribution of sites among the physiographic regions. It suggested that there might be a differential distributions on landforms, but it did not directly address that question. To directly address distributions within regions, it is necessary to have data on the distribution of landforms within the surveyed transects and a tabulation of the sites on these landforms.

To obtain these data, tabulations were made by 10 acre quadrats (i.e., squares 1/8 mi on a side). Each 10 acre quadrat within each surveyed transect was scored by its predominant landform: slope, bluff-base, or bottoms; rank of largest stream within the quadrat: no stream, 1-3 order stream, 4-5 order stream, or 9-10 order stream; and number of sites within the quadrat. The three landform categories are an obvious lumping of the landforms described earlier, with the exception of undissected upland flats which never occur in an area large enough to be the predominant landform in a 10 acre area. The bluff-base category includes footslopes. These are areas clearly above the floodplain and lower terraces, but yet obviously below a slope. In actuality, it is a class largely comprised of ancient high terraces; however, the present usage is based solely on slope geometry.

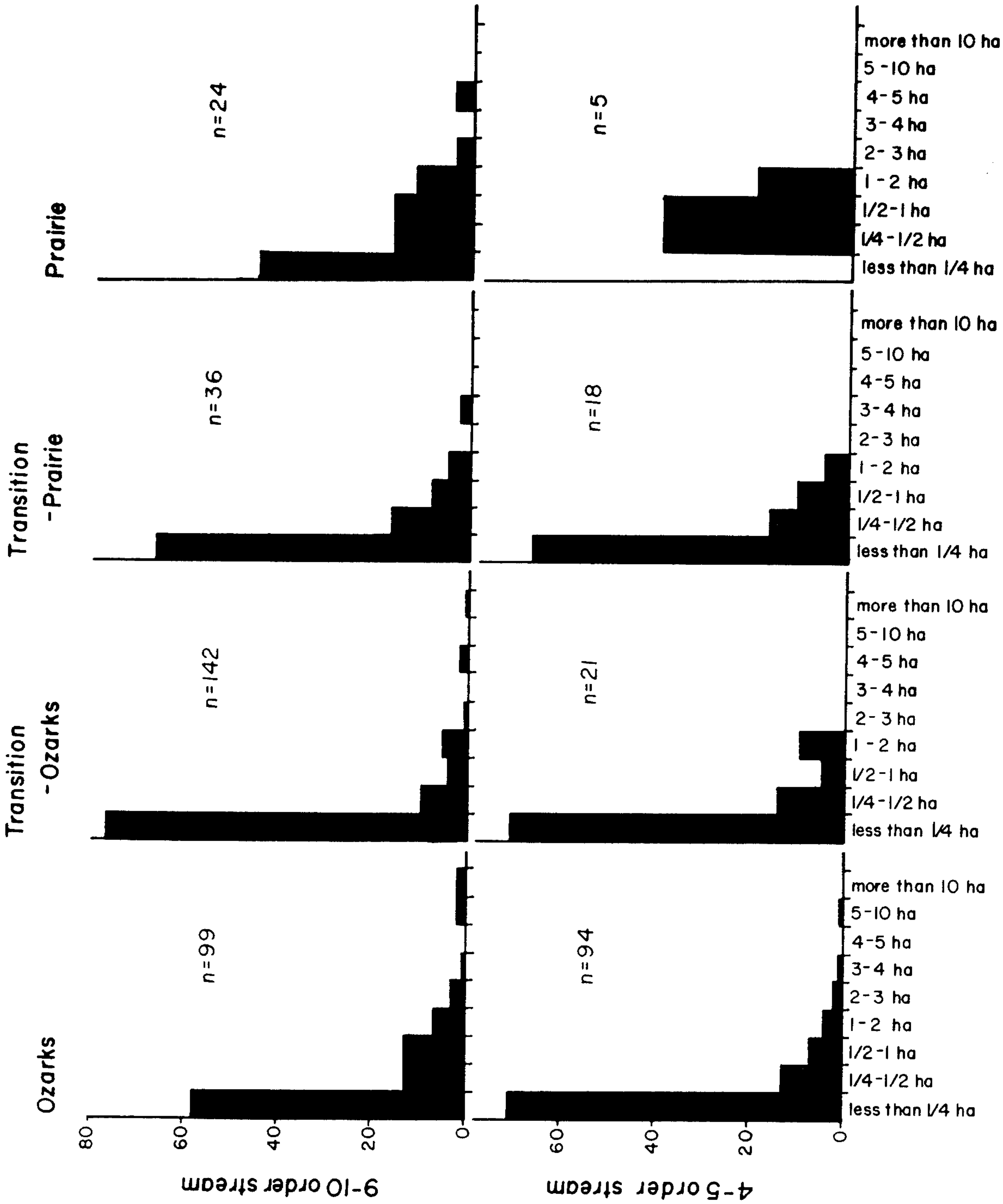


Figure 6. Distribution of site sizes, by region.

TABLE 5

Distribution of Stage 2 Site Sizes

	n	%	Cum %
<1/4 ha	296	67.4	67.4
1/4 - 1/2 ha	57	13.0	80.4
1/2 - 1 ha	38	8.7	89.1
1 - 2 ha	28	6.4	95.5
2 - 3 ha	7	1.6	97.1
3 - 4 ha	3	0.7	97.8
4 - 5 ha	4	0.9	98.7
5 - 10 ha	3	0.7	99.4
>10 ha	3	0.7	100.1

TABLE 6

Size Distributions, by Region/Rank Classes

	$\overline{X}$	1 s.d.	n
1A	14,245.58	76.465.34	99
1B	3,198.62	6,187.38	94
2A	8,154.92	60,589.89	142
2B	2,745.71	4,569.06	21
3A	3,417.33	6,614.15	36
3B	1,816.61	2,164.71	18
4A	7,077.08	11,059.67	24
4B	8,600.00	6,655.82	5
			439

Bottoms therefore include the modern floodplain and lower terraces; the lowest of which was the active floodplain virtually throughout the prehistoric period.

The landform and drainage combinations form a series of 12 classes: slope - no stream, slope - rank 1-3 stream, slope - rank 4-5 stream, slope - rank 9-10 stream, bluff-base - no stream, bluff-base - 1-3 stream, bluff-base - rank 4-5 stream, bluff-base - rank 9-10 stream, bottoms - no stream, bottoms - rank 1-3 stream, bottoms - rank 4-5 stream, bottoms - rank 9-10 stream. Tabulations were made of the number of quadrats of each type in each physiographic region and the number of sites in each type of quadrat. COE topographic maps were used, with reference to U.S.G.S. quads for land above 750' AMSL.

Chi-square tests of goodness-of-fit to random distributions were then calculated (Table 7). The percent of quadrats in each of the 12 classes were multiplied by the total number of sites in the physiographic region to generate the expected frequencies. The tests suggest that the distributions greatly differ from chance in all 4 regions. It is of interest to note how they differ, but also to compare the four regions. For this latter purpose, the chi-square values are graphed in Figure 7.

In the Ozarks, that is, the lower reaches of the S. Grand and Osage rivers and Tebo Creek, the Pomme de Terre and Little Pomme de Terre rivers, and Hogles and Bear creeks, sites are decidedly under-represented on slopes along 1-3 order streams or where there is no stream nearby, and decidedly overrepresented on slopes along 4-5 order streams, and all areas of bottoms except those close to 9th or 10th order streams.

The transitional areas are similar in their departure from randomness. In the portion that is still largely Ozark (Weaubleau Creek, Sac River, and central to upper parts of the Osage River) sites are less dramatically overrepresented on slopes and bluff-bases near major streams and very much overrepresented in the bottoms along 1-3 or 4-5 order streams. In the portion that is mostly prairie, sites are overrepresented along slopes and bluff-bases of 4-5 order streams, and in bottoms away from streams, and somewhat underrepresented on slopes away from all streams.

The prairie area in Henry County (upper S. Grand River and Deepwater and Cooper's creeks) is quite different. The only major departures from randomness of site distributions are an overrepresentation of sites on slopes, particularly near the major stream (S. Grand River).

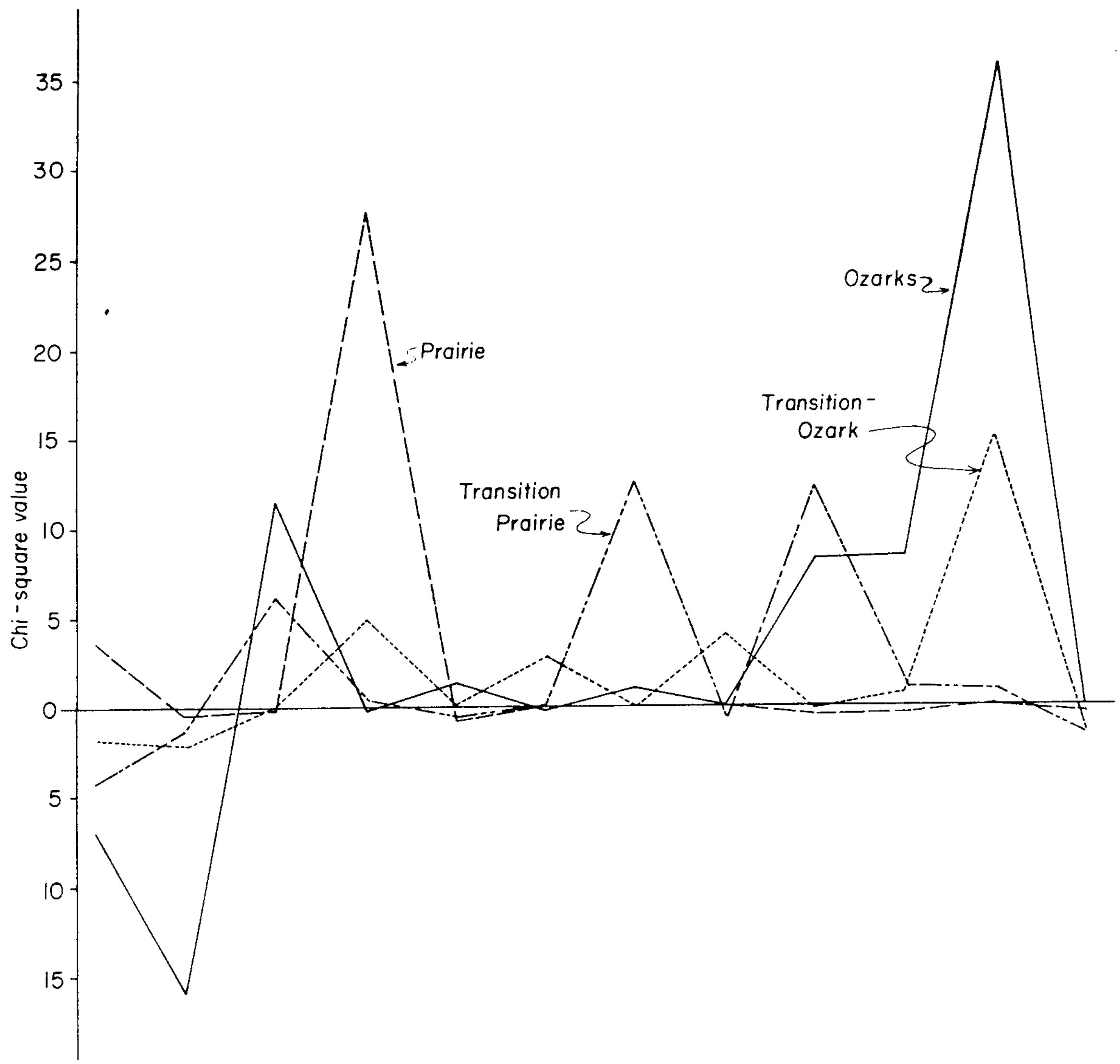


Figure 7. Comparison of Chi-square values for landforms.

TABLE 7

Summary of Goodness-of-Fit Tests on Landforms*

Region	X^2	DF	P
Ozarks	90.34	10	< .001
Transitional-Ozark	32.79	9	< .001
Transitional-Prairie	41.53	11	< .001
Prairie	33.77	9	< .001

*Full data for this table are given in Table B-4, tables volume.

Consideration of the details of these landforms in each region makes the observed distributions highly understandable. Slope characteristics vary considerably from one end of the reservoir to the other. Slopes in the Ozark portions of the reservoir are steep, even precipitous. Human habitation is not only difficult, it is virtually impossible. The large number of sites apparently on slopes along 4-5 order streams is somewhat deceptive. In many cases, the sites are actually in the bottoms, but since the majority of the 10 acre quadrat was slope, the quadrat itself was scored as slope. The overrepresentation of sites in bottoms is therefore also reasonable – if slopes are too steep, bottoms are a logical choice for habitation. It is generally impossible to distinguish lower terraces from the modern floodplain on topographic maps. Although there is a noticeable difference in elevation when these terraces are observed in the field, it is too small to show on a 10' contour interval map. Were it possible to evaluate this difference, it would probably appear that many bottomland sites are at the edge of a low terrace.

In the prairies, on the other hand, the slopes are far more gentle and the bluffs are low, perhaps no more than 20' to 30' above the river. The bottoms are not completely suitable for habitation, at least for permanent habitation. At a point just below the confluence of the S. Grand River and Deepwater Creek, the valley of the S. Grand narrows abruptly from 1 or 2 miles in width to no more than about 1/4 mi wide. Upstream from this point, the river flows in a narrow meander belt whose width is insignificant in relation to the total valley width. The abrupt narrowing of the valley, coupled with a shallow river gradient, produces excessive wetness of bottomland soils. Modern soils assessments in fact list severe limitations for a variety of uses because of the flooding potential and poor drainage (Grogger and Persinger 1976).

SUMMARY

1. Sites are not randomly distributed within the reservoir. Site density is considerably lower in the prairie areas in the northwest part of the reservoir (roughly most of Henry County). It is high, however, along smaller streams (Little Pomme de Terre River, Hogles Creek, Bear Creek) in the Ozark Highland.

2. The majority of sites everywhere are small – over 2/3 are 1/4 hectare or less. However, sites of varying sizes are not randomly distributed within each region. In all areas but the prairies, those sites in major stream valleys are considerably larger than those in smaller drainages. In the prairie, however, mean site sizes are more nearly equivalent throughout the region.

3. Within each region, sites are not randomly distributed among landforms. Sites in the Ozark and transitional areas are likely to occur less often on sloping areas than expected by chance and more often than expected by chance in bottomland or bluff-base contexts, while those in the prairies are likely to occur considerably more often than expected on slopes along major streams.

PREDICTIONS ABOUT TEMPORAL COMPLEXES

It is also of considerable interest to make statements about the occurrence of sites relating to the various individual identifiable cultural complexes. Of the 1428 sites recorded during Stages 1 and 2 survey, only 464 (32.5%) yielded projectile points. This total included 137 of the 476 (28.8%) Stage 2 sites. Only 281 sites yielded points identifiable to one of six identified complexes in the reservoir area. These 281 sites had a total of 384 identified components; 102 of these components were on 80 Stage 2 sites. The distribution of the 384 components by culture complex is given in Table 8; the number recorded during Stage 2 survey is given in the second column of the same table. The same sites are shown by physiographic region — drainage rank class for all components, and Stage 2 components only in Table 9.

Each stage of the survey equally well represents the relative frequencies of the types of cultural affiliations ($X^2 = 2.70$, DF = 5, $p > .70$ [Table B-5, tables volume]). However, sites from the two surveys with identifiable components are not similarly distributed in the 8 physiographic regions — drainage rank classes ($X^2 = 62.89$, DF = 7, $p < .001$ [Table B-6, tables volume]). Thus, while it will be possible to use all identified components for some purposes, for those analyses where concern is with the distribution of sites in regions, we may use only the Stage 2 data. A comparison of the 137 Stage 2 sites with points suggests they are represented in the 8 regions in proportions similar to the distribution of all 476 Stage 2 sites (Table B-7, tables volume); the same is true of the 80 sites with points identifiable to one of the six identifiable cultural complexes (Table B-8, tables volume). Thus, the sparse representation of identifiable components in the prairies portion of the reservoir is a reflection of the decreasing density of sites in that part of the reservoir.

A series of X^2 goodness-of-fit tests (Table 10) for complexes from Late Archaic through Woodland (the frequencies of sites for Dalton and Early/Middle Archaic are too small to test) suggest that in all cases, sites are dispersed throughout the four major physiographic regions in a manner

TABLE 8

Distribution of Components by Culture Complex

Component Type	Total No. of Components	No. of Stage 2 Components
Dalton	11	4
Early/Middle Archaic	35	6
Late Archaic	66	18
Middle Woodland	56	16
Woodland A	101	25
Woodland B	115	33
	384	102

TABLE 9

Identified Components by Physiographic Region

		Region							
		Ozark		Trn.-Oz.		Trn.-P.		Prairie	
	Component Type	9-10	4-5	9-10	4-5	9-10	4-5	9-10	4-5
All Components	Dalton	2	0	5	1	0	0	1	2
	Early/Middle Archaic	11	1	8	0	2	0	9	4
	Late Archaic	29	10	6	1	0	1	9	10
	Middle Woodland	16	10	10	2	1	1	10	6
	Woodland A	29	23	22	2	1	0	13	9
	Woodland B	37	21	28	1	4	1	10	12
		124	65	79	7	8	3	52	43
Stage 2 Only	Dalton	0	0	3	1	0	0	0	0
	Early/Middle Archaic	3	1	2	0	0	0	0	0
	Late Archaic	10	3	1	1	0	1	2	0
	Middle Woodland	5	4	4	2	0	1	0	0
	Woodland A	3	8	10	2	0	0	1	1
	Woodland B	4	11	11	1	2	1	3	0
		25	27	31	7	2	3	6	1

TABLE 10

Summary of Goodness-of-Fit Tests for Cultural Complexes in Physiographic Regions*

Period	X^2	DF	P
Late Archaic	6.40	3	.09
Middle Woodland	1.74	3	.63
Woodland A	4.32	3	.23
Woodland B	0.56	3	.91

*Full data for this table are given in Table B-9, tables volume.

TABLE 11

Summary of Analyses of Variance*

	Physiographic Region			Hydrological Group		
	F	DF	p	F	DF	p
Late Archaic	.28	2, 15	.76	3.80	1, 16	.07
Middle Woodland	.35	3, 12	.79	1.00	1, 14	.34
Woodland A	3.65	3, 25	.03	3.54	1, 27	.07
Woodland B	.02	3, 44	>.99	.03	1, 46	.86

*Full data for this table are given in Tables B-10 and B-11, tables volume.

that deviates only by chance from an expectation based on proportional representation in the total group of Stage 2 sites. Only the 4 major regions are used without the division of each into the 2 drainage rank classes because of the very small number of sites expected in some categories. (Some would argue that as it is, some of these numbers are too small because some expected frequencies are less than 5. Others, however, [for example, Snedecor and Cochran 1967: 235] suggest that X^2 is accurate enough if the smallest expected frequency is at least 1. All tests in Table 10 meet this requirement.)

Examination of all sites taken together, as was done in the previous section, can potentially be misleading because it can tend to "average over" a set of distributions that are in fact quite dissimilar, masking the differential distributions of sites of different periods. Such appears to not be the case with the Truman Reservoir analysis, however. The chi-square tests suggest that the proportional representation of all sites in the reservoir is equally representative of all culture complexes. This is true at least for those sites occupied subsequent to the Hypsithermal. It is unfortunate that site numbers are so small for the pre-Hypsithermal (i.e., Dalton, Early and Middle Archaic) that they too cannot be tested, for one of the original stated goals of the survey (Roper and Wood 1975) was to examine whether the Hypsithermal hiatus apparent at Rodgers was unique to that site or whether it was a drainage-wide phenomenon. It is apparent that occupation was indeed continuous; but what is not yet known is whether or not it was evenly distributed throughout the area.

Size distributions of all sites ascribed to each cultural complex are shown in Figure 8a. Since it may be the case that some sizes are inflated by the presence of more than one cultural component, the sizes of only those sites that have no more than one component represented in the survey collections are also shown. Comparable sets of sizes are given for Stage 2 sites only in Figure 8b.

If we were to try to examine the distributions of sizes of sites of each culture complex by region, it would prove impossible because of small sample sizes. For example, the Woodland B complex is the most numerous in the reservoir with 115 components identified from Stages 1 and 2 survey. Yet, only 17 of these are single component sites recorded during Stage 2 survey. If we may assume that the sizes of sites of Stage 1 are representative of the sizes of sites in each region, even though that survey did not accurately represent frequencies, then both Stage 1 and 2 survey data may be used to evaluate relative sizes of sites in each region. Means

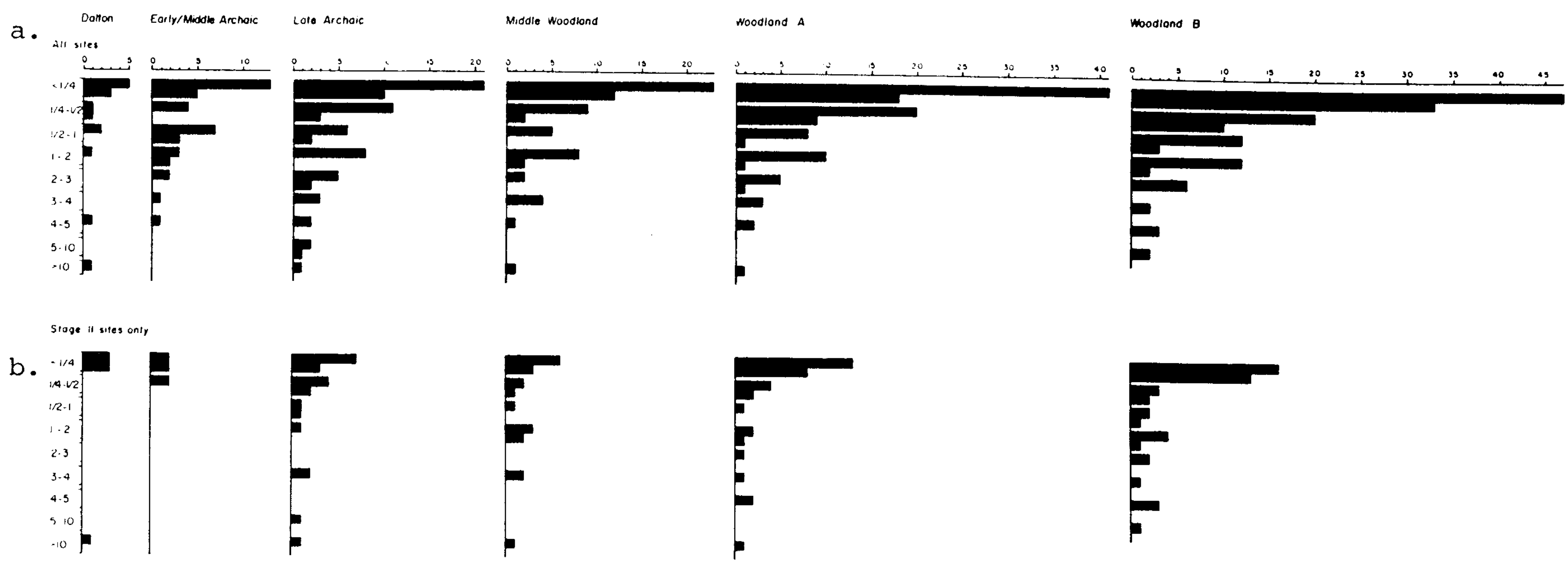


Figure 8. Size distributions of sites.

and standard deviations of the sizes of single component sites, by region, are presented in Table B-10. Only in the case of the sites with contracting stemmed points are sites in different regions significantly different in size (Table 11). Significance may well, however, be largely derived from the presence of only a single small site in the Transition-mainly prairie region.

Sizes of sites are also compared across the two major valley rank classes (Table B-11). In this case, none of the derived F-ratios attain statistical significance (Table 11), even though initially there seem to be disparate means for most time periods.

Examination of the location of sites on the landscape is approached differently for the temporal analysis than it was for sites as an aggregate. Rather than examining proportions of sites on landforms, which would be difficult because of the small number of Stage 2 sites with diagnostic materials, we have chosen to examine sites, by cultural complex, across two attributes of location: nearest watersource and location type. The first of these two variables is simply rank of nearest watersource as determined from U.S.G.S. quadrangle maps (7.5' series). The second needs significantly more explanation.

Roper (1979: 9) has previously argued that a relevant way to examine sites in relation to topography is to examine not only the landform a site is <u>on</u>, but what it is <u>near</u>. Accordingly, in the Truman analysis, five location types were used: upland, bluff-base, river edge – away from the bluffs, river-edge and bluff-base together ("corner"), and mid-terrace – away from either bluff-base or river edge.

The rank of nearest watersource is tabulated in Table B-12. Ranks 1-3 are grouped, as are 4-5, and 9-10. A chi-square analysis suggests that sites of all periods taken together are randomly distributed within the drainage network (X^2=13.13, DF=10, p=.20). This observation contradicts the interpretation by Joyer and Roper (1980: 20) that Dalton, Early, and Middle Archaic sites are often along large streams while Late Archaic sites are better distributed within the drainage.

The distribution of sites by location type is given in Table B-13. In this case, a chi-square analysis suggests rejecting the hypothesis that sites are randomly distributed (X^2=33.26, DF=20, $.02 < p < .05$). Examination of the major departures from randomness is disappointing however. Early/Middle Archaic sites are overrepresented in the uplands and underrepresented along the river edge. This latter may be accounted for in at least two ways. One is that the river edge itself is, in some

places, the modern floodplain which is too young to have sites on it or in it. This should be true for sites of all ages, however. In other places, the river is moving laterally and cutting into a T-1b which forms the river edge. Early/Middle Archaic sites have a high potential for being buried in such sediments and should therefore be difficult to record with normal survey procedures.

Summary

1. Sites of each temporal unit from Late Archaic through Late Woodland are distributed in physiographic regions in proportion to the total aggregate of sites.

2. Sizes of sites of each complex do not differ between either physiographic regions or drainage classes of varying rank.

3. Sites of various cultural complexes are randomly distributed within the drainage network.

4. Sites of various cultural complexes are not randomly distributed on landform situations. However, the major departure from randomness is produced by the Early and Middle Archaic sites which are overrepresented in the uplands and underrepresented along the river edge.

CHAPTER 3

THE CONTINUED SURVEY

The Scope-of-Work for the continued survey by the University of Missouri in Truman Reservoir called for maximizing survey in the multipurpose pool and 100% survey of the public use areas. These surveys were to continue using the stratum and transect strategy developed during Stage 2 survey (Roper 1979a) and techniques and procedures adopted during that survey.

The survey in the multipurpose pool, performed first because of rising water, was designated Stage 3, while the survey in the public use areas was referred to simply as the Public Use Area survey. Additional sites were recorded during survey along portions of a powerline to be constructed between the dam and the city of Clinton; during a survey whose primary purpose was to map the availability of chert resources (Ray Vol. II, Part 3); and during the assessment of resources in the vicinity of a gravel pit.

The Survey Segments Defined

The Stage 3 survey is defined as that part of the survey conducted in the multipurpose pool of the reservoir. Previous survey (Stage 1, Stage 2) had been conducted prior to any form of impoundment of water in the reservoir, and had considered all fee lands rather than arbitrary portions thereof (multipurpose pool, 5-yr. flood pool, public use areas, etc.), although survey forms do record which kind of unit a site was in. Stage 2 transects had run perpendicular to the major stream segment defining a stratum and from acquisition boundary to acquisition boundary. In all cases, transects were completely surveyed.

Stage 2 survey had been designed to cover a 10% stratified random sample; it was implemented by surveying 10% of the transects in each of 22 strata. The 10% figure was pragmatic, derived by considering available temporal and financial resources in relation to estimates of how much land could be surveyed by a crew of a given size during a given period of time. Unfortunately, it had not allowed for additional transects to be surveyed.

To implement Stage 3 survey, it was therefore necessary to reorder the unsurveyed transects in each stratum and select those to be surveyed during Stage 3. Rather than select a predetermined percent of the transects, it was deemed advisable to prioritize all unsurveyed transects. This would allow flexibility in selection during Stage 3. That is, listing all transects by survey priority would allow the surveyor to select the first 10%, for example, and survey them. Then if time were still available, an additional 5% or 10%, or whatever, of the transects could be selected and surveyed. In this manner, at whatever point the survey was when time ran out, a percent equal to the highest percent surveyed in all strata could be considered to be a random sample at that fraction. Prioritization of all transects and specification of which transects were actually surveyed would also allow future surveys to survey other portions of the same transects, thus permitting eventually a random sample of the fee lands, at a sampling fraction equal to the highest percent surveyed in all portions of the fee lands.

All unsurveyed transects in each stratum were enumerated, in order. A table of random numbers was then consulted to rearrange transects into an order of priority for survey. Lists of survey priority for all transects not completely surveyed in Stage 2 are given by stratum in the Management Summary.

The definition of the Public Use Area survey was rather more straightforward. It was simply comprised of all public use areas in the reservoir, both those to be developed initially and those slated for future development. While these areas were not surveyed in the same manner as the stratum and transect areas, they have been related to the strata in the tables.

Six of the total 29 miles of a powerline being constructed by the Southwest Power Authority from the Truman Dam to the city of Clinton cross Corps of Engineers land. At the request of the Corps of Engineers, these six miles were surveyed by University of Missouri crews in April 1979; the remaining portion of the powerline was separately contracted by the SPA (McNerney 1979).

Also during 1979, an examination was performed of the chert resources, including both bedrock and stream cobbles, available to inhabitants of selected sites, primarily ones at which extensive excavations had been performed. The results of this study are reported in a separate study by Ray in Vol. II, Part 4. However, during the course of fieldwork, a number of previously unrecorded sites were located. These sites, identified as such, are described in this report.

Sites located during examination of borrow areas, and other construction areas, including a gravel pit, were also

recorded. They too are described in this volume. As with all other sites recorded, they are related to survey strata.

Implementation — Permanent Pool (Stage 3 Survey)

Knowledge of available time and funding, along with calculations of rates of coverage per crew member per day derived from previous surveys, suggested coverage of 10% would be attainable during Stage 3 survey. Accordingly, the first 10% of the transects in each stratum were selected from the prioritized lists.

For one of several reasons, the first 10% were not always the transects actually surveyed. In some instances, some of the transects in each of about half the strata were far enough upstream to contain no permanent pool. When this was ascertained to be the case, the transect was skipped and the next one on the list that did contain permanent pool was substituted. In some strata, substitutions had to be made for several of the transects in the first 10%. In other cases, selected transects contained permanent pool but either they or their access was so badly flooded at the time of survey that fieldwork was not possible. In such cases, another surveyable transect was substituted. Finally, an additional transect, not randomly selected, was occasionally surveyed. These were judgmental transects and were surveyed for some particular purpose. The complete status of all surveys performed by the University of Missouri from 1976 to 1979 is given in the Management Summary.

Fieldwork Procedures

Survey crews were normally composed of three persons — one as a supervisor, the other two as crew members. Survey crew chiefs were normally persons experienced in archaeological survey, often with previous experience in supervising a similar sized crew. Several of them had previously been members of survey or excavation crews in Truman Reservoir. Crew members may or may not have had prior field experience, but most of them had prior field experience in archaeology, in a few instances, including field experience in Truman Reservoir.

Responsibilities of the supervisor included selecting the portion of an assigned area for the day's survey work; completing all survey records, maps, and photographs; and generally guiding the field efforts of the crew. The primary responsibility of the crew members was to work with the supervisor, walking fields, and helping record and collect sites.

Survey strata and the selected transects were assigned, one at a time, to survey crews. Once a stratum and specific transects were assigned, the transects were drawn on field maps (COE topographic, COE real estate, and U.S.G.S. topograhic) and surveyors were cautioned to check for the previously recorded sites within the transects. The order in which transects were to be surveyed was a logistics decision left entirely to the discretion of the crew chiefs.

Crews were instructed to space themselves at intervals of 20-25 m and walk back and forth across the area to be surveyed. Compasses were used to help follow and stay within the transect. In areas in which the ground surface was obscured, shovel testing was employed to expose small portions of the surface. As practiced in the Truman Reservoir survey, shovel testing consisted of digging a small test hole, as wide and deep (if possible) as a shovel blade and examining the removed soil for inclusions of cultural material. The dirt was then replaced in the hole. Shovel test holes were generally spaced about every 20-25 m. As with Stage II, shovel tesing was discretionary. That is, inasmuch as shovel testing is time consuming, it was left to the discretion of each crew as to when surface conditions were such that its employment was necessary.

Upon locating cultural material, intervals were narrowed to determine the extent of the site. If shovel testing was being employed, test holes were similarly narrowed. A surface collection was made, bagged, and labelled with a field number. A site form and sketch map were completed; a photograph – normally in 35 mm black and white was taken; and sites were plotted on field maps. A temporary field number, used on collection bags, site forms, photo records, was assigned. This number was composed of the crew chief's initials, the date, and the sequence number for the crew for that date. For example, 23BE874 was originally labelled as RGA-62679-1, meaning the first site recorded on June 26, 1979 by the crew led by Ricky G. Atwell. The site form (Fig. 9) is the same form used during the Cultural Resources survey, with only minor modification. Permanent site numbers (Archaeological Survey of Missouri numbers) were later assigned in the laboratory.

An additional form completed each day was the "Survey Unit Summary" form, a copy of which is reproduced here as Fig. 10. Its purpose was to record a formal running commentary on where a survey team had been on a given day, generally by listing stratum and transect and Corps of Engineers real estate tracts, how much land (in acres) had been surveyed, what sites had been recorded, and what was photographed. This form was similar to the "Daily Survey Log" used during the Cultural Resources Survey, but was a modification of that form and included more specific information.

DSN ________________

Serial # ____________

HARRY S. TRUMAN RESERVOIR

SITE SURVEY FORM

(00101) ASM No. ________________ (00501) Field No. ____________

Survey Leader ____________________ Date ________________________

Surveyor(s) ____

(01001) Legal location _____¼_____¼_____¼ Sec _____ T _____ R _____

County ____________ Township ____________ (01501) Tract # ____________

(02001) Quadrangle ____________ (15' 7.5') (02501) COE Map # __________

Landmark:
Site is located ____________ ____________ from ____________
(distance) (direction) (landmark)

(03001) Position in reservoir: borrow area relocation

Public use area (name): ________________________________

Permanent pool 5-year flood pool Other ________________

(03501) Elevation ______' to ______' MSL

(04501) Stratum# __________ Transect # ____________

ENVIRONMENT

Landform: Floodplain Terrace Slope Dissected Upland

Microterrain: ____

Closest watersource: Stream name ________________________________

Elevation of watersource: ______________' to ______________' MSL

Watersource is ______________m to ______________ of site
(direction)

Site is on R L bank of stream (looking downstream)

Soil (field observations: Wet Dry Other ____________________

Color: black dark brown light brown yellow-brown

yellow other ________________________________

Figure 9. The Harry S. Truman Reservoir Site Survey Form.

ASM No. ______________

HST Res. Site Survey Form p. 2

Field No. ____________

SITE CONDITIONS

Site in: Woods Pasture Cultivated Field Feedlot
Wasteland Other ______________________________

Ground cover: 0-10% 10-50% 50-90% 90-100%

If cultivated: fallow plowed and/or disked planted
Crop up: corn beans wheat other ______________
how tall? ______________

Rainfall: not significant light since worked moderate
heavy since worked

COLLECTION

Number of surveyors __________ Time spent collecting ___________ hr.

Weather conditions: rain snow hail mud heat cold
overcast clear

Surveyor condition: ______________________________

Collection strategy: ______________________________

Materials collected: Points _____ Pottery _____ Bifaces _____
Scrapers _____ Drills _____ Cores _____ Debitage _____
Other chipped stone tools _____ Manos _____ Rock _______
Bone _____ Shell _____ Other ______________________

Material observed but not collected ______________________

Preliminary culture assessment: Paleo Dalton Middle Archaic
Late Archaic Woodland Mississippian
Historic Native American Historic Euro-American Unknown

Site type: Habitation Camp Mound Shelter Quarry
Workshop Unknown

Site size: AOS = ___________ + m^2 partial total

How determined: Paced Eyeballed Taped

Depth (if known) ______________ How determined? ______________

Surface Features: Prehistoric ______________________
Euro-American ______________________

Is site previously recorded? Yes No Excavated? Yes No

Photographs B/W Color slides Color print
Roll # ______________ Neg. No(s). ______________

Remarks:

(11 May 1978)

Figure 9. Continued.

HARRY S TRUMAN RESERVOIR
SURVEY UNIT SUMMARY

Survey Leader Date

Surveyor(s)

Transect Survey:
Stratum # Transect #

Public Use Area Survey:
Name of area

Tract #'s:

Number of acres surveyed:

Survey conditions - general:

List sites recorded (field numbers):

If shovel testing employed, describe where, and the strategy employed for shovel testing:

Photographs:

Roll #	Neg. #	Subject	Shutter	f/stop

Figure 10. The Harry S. Truman Reservoir Survey Unit Summary Form.

Implementation — Public Use Areas

While sites recorded within public use areas were ultimately related to stratum, the public use areas were actually surveyed as units. Public use areas were assigned, one at a time, to survey crews. The crew chief was free to decide on the best strategy for completely covering the area.

Fieldwork procedures were identical to those used during the Stage 3 survey, except that following transects was not necessary. Otherwise, surveyor spacing, shovel test strategy, and other field procedures remained the same. The only variation in recording procedures was the substitution of public use area name for stratum and transect as the basic unit for recording progress.

Corps of Engineers Master Plan and construction maps were used in the field, usually in addition to U.S.G.S. topographic maps and COE real estate maps. COE topographic maps were used to the extent possible, but since they do not map land above 750' AMSL, their utility was limited.

The lake level was rising during Public Use Area survey. Parcels of land were surveyed to the water line, wherever it was at the time of survey.

Laboratory Coding of Data

Data from the survey records are contained in two computer site files. The first of these is formatted for data storage/retrieval using SELGEM. It contains the following categories: Archaeological Survey of Missouri number, Harry S. Truman Reservoir survey field number, legal location (1/4, 1/4, 1/4 Sec., T, R), COE tract number, U.S.G.S. quadrangle map name, COE topographic map number, position in reservoir (i.e., permanent pool, public use area — with name, other fee lands, road relocation, etc.), elevation, type of site (open, mound, shelter), stratum number, and transect number if in sample survey transect. The file can be queried for any of these entries. It contains all sites surveyed by the University of Missouri under Corps of Engineers contract, including Stages 1, 2, and 3, Public Use Area, borrow area and relocation, Downstream Stockton, and miscellaneous recorded sites. It also contains records, as complete as possible, of all sites recorded in Archaeological Survey of Missouri files prior to the beginning of the Cultural Resources survey in 1975.

Because SELGEM was not functioning at the University of Missouri in 1975 when the Cultural Resources Survey began, a substitute data file was built, on cards, using the Statistical Package for the Social Sciences (SPSS: Nie, et al. 1975). This file was used to generate the statistics on

site recording presented in Vol. IV, Chapter V of the Cultural Resources Survey report (Roper 1979a) and contains a different kind of data than the SELGEM file. It was retained and expanded even when SELGEM became functional because it contained analysis data that even if entered into the SELGEM file would have to be retrieved and put into SPSS format for analysis with that program. This file, therefore, has been completed for all sites recorded during any of the University of Missouri surveys performed between 1975 and 1979, but contains only those sites. The data contained in this file include ASM site number, site type (open, mound, shelter, isolated find, historic), stream, surveyor, size, ground cover, rainfall, month of survey, nature of ground cover, time in person/hours spent recording the site, whether or not shovel tested, whether or not in a transect selected during Stage 2 or 3 survey, and, if so, transect number. This file was used to generate the statistics presented in Chapter 4 of this report; its recently added REPORT program (Hull and Nie 1979) generated the tables of site characteristics in that chapter.

CHAPTER 4

THE SITES

Survey Coverage

The Stage 3 survey, conducted in the below 706' AMSL portion (i.e., permanent pool) of 111 transects (of 1060 potential transects = 10.47%), covered a total of 6129.83 acres, or 11.36% of the permanent pool (or 3.71% of total Corps fee lands). Coverage in all strata was not equal, however. Table 12 lists areas within each stratum, as well as areas in permanent pool within each stratum, and areas, percentages and transects actually surveyed. (Note: Areas within each stratum are the same as those used in the Cultural Resources Survey. They were calculated from the Tract Registers on the segment maps and are accurate to within 1% of the acreage figure for land acquisition used by the Corps of Engineers. The figures for permanent pool within each transect were determined by the method of squares (Monkhouse and Wilkinson 1971: 73-75) and are accurate to within 3% of the acreage figure used by the Corps of Engineers for the permanent pool of the reservoir.)

The Scope-of-Work for Modification P00001 called for an effort to "be directed to completing 100 percent coverage of the public use areas." This goal was accomplished with minor exceptions. The first exception was those portions of each public use area that were already inundated. Survey was conducted to water line in all instances, and all lands not inundated were surveyed for cultural resources. The second exception was the exclusion of the Clinton, Deepwater, and Osceola city parks and the Osceola Golf Course. Exclusion of these areas from survey was made with the oral consent of the Corps of Engineers and was done for the simple reason that all development of those areas had been completed long before Modification P00001 was made. A total of 15,511 acres were surveyed, a figure equivalent to 9.4% of fee lands (Table 13).

Prehistoric Sites

STAGE 3 SURVEY

A total of 161 prehistoric sites was recorded within the transects selected for survey during Stage 3, an additional

Table 12

Stage 3 Survey Summary

Stratum Name	Str. No.	Area (acres)	Area in Perm. Pool	No. Trn.	No. of Trn. Chosen	Trn. Chosen	Area In Trn.	% of Area	% of P.P.	No. Sites	Density Mi^2	Density Km^2	Old Density Mi^2	Old Density Km^2	Isol. Finds	Hist. Sites	Out-of-Transect Preh. Sites	Out-of-Transect Isol. Finds	Out-of-Transect Hist. Sites
Middle Pomme	1	9,498.32	1,485	83	8	3,4,5,6,10, 21,24,33	682.50	7.19	45.96	19	17.82	7.33	29.35	11.49	0	0	4	0	0
Lower Pomme	2	4,761.19	3,345	43	8	3,7,8,12,17, 24,28,30	457.50	9.61	13.68	14	19.58	7.56	20.62	8.06	1	0	5	2	2
Little Pomme	3	4,172.13	1,180	53	6	2,11,14,16, 17,33	220.00	5.27	18.64	9	26.18	10.10	53.31	20.79	0	1	2	0	0
Hogles Creek	4	3,908.41	1,522.5	38	5	19,25,26,30, 37	172.50	4.41	11.33	3	11.13	4.29	19.42	7.58	1	0	1	0	0
Bear Creek	5	1,566.91	200	18	2	1,4	83.25	5.31	41.63	1	7.69	2.97	38.89	15.22	0	0	1	0	2
Weaubleau Cr.	6	2,087.26	635	28	4	1,4,8,13	136.25	6.53	21.46	6	28.18	10.87	47.73	18.58	0	1	3	0	0
Sac River	7	4,752.55	700	28	5	3,10,11,12,13	54.25	1.14	7.75	1	11.80	4.55	18.09	7.07	0	0	2	0	0
Salt Creek	8	1,049.25	132.5	16	2	7,14	20.00	1.91	15.09	0	0	0	34.48	13.70	0	0	0	0	0
Gallinipper Cr.	9	1,582.76	302.5	25	3	3,18,21	41.25	2.61	13.64	0	0	0	25.50	9.96	0	0	0	0	0
Upper Osage	10	10,939.70	2,115	87	8	18,31,36,62, 63,71,72,74	166.25	1.52	7.86	3	11.55	4.46	25.75	10.05	1	0	0	1	0
Upper Mid Osage	11	9,542.72	4,252.5	70	6	10,14,38,44, 54,56	506.75	5.31	11.92	9	11.37	4.39	40.24	15.72	1	0	2	0	0
Lower Mid Osage	12	17,493.41	6,867.5	77	7	8,19,25,28, 66,70,73	659.00	3.77	9.60	17	16.51	6.37	10.06	3.93	0	0	1	0	0
Lower Osage	13	10,235.73	5,202.5	54	5	10,13,42,43, 53	565.00	5.52	10.86	14	15.86	6.12	18.50	7.23	0	0	6	2	0
Little Tebo	14	5,765.46	2,217.5	44	4	11,13,18,33	45.33	7.86	2.04	4	56.47	21.79	15.39	6.01	0	0	1	0	0
Lower Tebo	15	6,979.76	2,332.5	34	3	15,17,21	212.50	3.04	9.11	12	36.14	13.94	28.73	11.22	1	0	8	0	1
Upper Tebo	16	10,545.41	1,240	44	4	25,34,36,40	202.50	1.92	16.33	10	31.60	12.19	23.00	8.98	2	0	1	0	0
Lower S. Grand	17	13,400.02	5,682.5	64	6	1,2,21,31, 37,42	380.00	2.84	6.69	12	20.21	7.80	10.05	3.93	0	0	0	0	0
Middle S. Grand	18	12,879.48	3,237.5	56	5	9,23,32,41, 45	281.25	2.18	8.69	12	27.31	10.53	7.56	2.95	0	0	1	0	0
Confluence	19	6,325.61	2,910	46	5	9,19,23,24, 36	322.50	5.10	11.08	4	7.94	3.06	15.75	6.16	0	0	4	0	0
Upper S. Grand	20	16,580.41	4,812.5	78	7	28,31,55,56, 62,64,66	495.00	2.99	10.29	5	6.46	2.49	2.44	0.95	1	0	2	0	0
Deepwater Cr.	21	8,835.95	3,137.5	50	6	22,23,34,39, 42,43	386.25	4.38	12.31	6	9.94	3.84	2.74	1.34	1	0	2	0	0
Cooper's Cr.	22	2,529.00	450	24	2	9,14	40.00	1.58	8.89	0	0	0	7.41	2.90	0	0	0	0	0
Total		165,431.49	53,960	1060	111		6,129.83	3.71	11.36	161	16.81				9	2	46	5	5

Table 13

Public Use Area Survey Summary

Name	Acres	% of Total Fee Lands	No. Sites	Density Mi^2	Density Km^2	No. IF	No. Historic	Stratum
Kaysinger Bluff	437	.26	9	13.18	33.74	2	0	13, 14
Shawnee Bend	536	.32	3	3.58	9.16	0	0	13
Sterett Creek	310	.19	0	0.00	0.00	0	0	14
H. S. Truman State Park	1,460	.88	30	13.15	33.66	2	0	12, 17
Thibaut Point	275	.17	2	4.65	11.90	0	0	14
Long Shoal	466	.28	23	31.59	80.87	2	0	17
Windsor Crossing	800	.48	15	12.00	30.72	1	0	16
Cooper Creek	732	.44	2	1.75	4.48	0	0	21
Sparrowfoot	1,053	.64	14	8.51	21.79	0	0	20, 21
Roscoe Access	13	.008	2	98.46	252.06	0	0	10
Sac River Access	23	.01	2	55.65	142.46	0	0	7
Berry Bend	624	.38	27	27.69	70.89	9	0	12
Talley Bend	273	.17	10	23.44	60.01	0	0	11
Brush Creek	256	.15	4	10.00	25.60	0	0	10
Crowe's Crossing	334	.20	8	15.33	39.24	0	0	10
Osage Bluff	1,057	.64	5	3.03	7.76	0	0	13
Fairfield	701	.42	16	14.61	37.40	0	0	2, 3
Cross Timbers	44	.03	2	29.09	74.47	0	0	1
Clinton City Park	84	.05	-	-	-	-	-	-
Osceola City Park	510	.31	-	-	-	-	-	-
Deepwater City Park	26	.02	-	-	-	-	-	-
S. Grand Point	400	.24	17	27.20	69.63	1	1	14
Grandview Point	410	.24	0	0.00	0.00	0	0	17
Long Island	290	.18	19	41.93	107.34	0	0	18
Hay Creek	392	.24	9	14.69	37.61	1	0	18
Sugarcamp Hollow	305	.18	12	25.18	64.46	0	0	13
Little Pomme	350	.21	7	12.80	32.77	0	0	3
Prairie Creek	378	.23	8	13.54	34.66	0	0	2
Swing Bridge	407	.25	12	18.87	48.31	1	0	12
Rancho Point	714	.43	14	12.55	32.13	1	0	12
South Pomme	319	.19	4	8.03	20.56	0	0	1
Cedar Grove	345	.21	9	16.70	42.75	1	0	12
Brown's Ford	362	.16	5	12.21	31.26	1	0	11
Bucksaw	414	.25	21	32.46	83.10	1	1	18
Scout Camp	511	.31	19	23.80	60.93	2	0	11
TOTAL	15,511	9.4	330	13.62	34.87	25	2	

46 sites occurred outside the boundaries of the selected transects. These latter were encountered by survey crews as they crossed terrain not within a selected transect in order to get to a selected transect, or were just outside the transect, or were recorded by excavation crews as they crossed terrain to arrive at a site to be excavated, or via monitoring of cleared areas, or by one of several other miscellaneous processes. Table 12 lists the distribution of all of the sites by stratum, both within and without the selected transects.

One hundred fifty-eight of the 161 in transect sites (98.1%) are open sites, the other three (1.9%) are rockshelters. No mounds were recorded. Over 1/3 of the sites (54 of 161=33.5%) were in fields, but 48 sites (29.8%) were in cleared land – reflective of the change in the landscape since 1976 when no sites were recorded in cleared land. The remainder of the sites were in woods (n=22=13.7%), pasture (n=22=13.7%), waste (n=10=6.2%), and other conditions (n=4=2.5%). Ground cover was not specified for one site (0.6%). In contrast to the Stage 2 survey in which the percent of sites in each ground cover percent category was nearly even, those in the Stage 3 survey were rather more often in the 50-90% ground cover category with fewer in the 0-10% and 90-100% cover categories: 0-10%=32=19.9%, 10-50%=38=23.6%, 50-90%=55=34.2%, 90-100%=31=19.3%. Not unexpectedly, a relationship does exist between the kind of ground cover on a site and the percentage of the ground that is obscured (ϕ=.56; see Table B-14, tables volume).

The overall increase in ground cover since 1976 probably led to a larger percent of the area being shovel-tested – certainly more of the recorded sites were shovel tested (48 of 161=29.8%) than during the Stage 2 survey (22.0%). Not unexpectedly, it was performed more often on sites with a high percentage of ground cover (Table B-15, tables volume).

Of the 46 prehistoric sites recorded outside the selected transects, 43 (93.5%) are open sites, 3 are shelters (6.5%). The largest number of these sites (n=18=39.1%) were in cleared areas. The remainder were in pasture and fields (n=8=17.4% each), woods (n=4=8.7%), wasteland (n=3=6.5%), and miscellaneous other conditions (n=5=10.9%). It is probably not surprising that out-of-transect sites are less often in high percent of ground cover (0-10%=11=23.9%; 10-50%=15=32.6%; 50-90%=9=19.6%; 90-100%=9=19.6%) and less often found via shovel testing (not shovel tested = 36=78.3%; shovel tested = 10=21.7%).

The salient descriptive characteristics of each site are presented in Tables B-16 and B-17, to be found in the tables volume. Descriptive data include the site number, stratum and transect, site type (open, shelter, mound), size, type

and amount of ground cover at the time of recording, the month during which the site was recorded, and whether or not shovel testing was employed during the survey of the site. The collections and cultural affiliations, if determinable, are described in Chapter 5 of this part of the report. Chapter 6 then describes the distribution of sites and their correspondence with the Stage 1 and 2 distributions derived in Chapter 2.

A number of the open sites had previously been recorded during University of Missouri surveys, particularly during Stage 1. Their encounter during Stage 3 afforded the opportunity to monitor them – an activity called for in the basic contract Scope-of-Work – and to assess the consistency from survey to survey of types of artifacts, extent of scatter, and other site appearance characteristics.

If the site number of one of the 3 rockshelters, 23BE125, seems familiar, it should. Yes, the Stage 3 survey "found" Rodgers Shelter. Since this site has been extensively excavated and voluminously reported by others (e.g., McMillan 1971; Wood and McMillan, eds. 1976; Kay, ed. 1978), it need not be described here. It is in Transect 3 of Stratum 1, the Middle Pomme de Terre River; its tabulation and recording here is, of course, entirely appropriate to the reporting of a survey listing all resources in the area.

The other two rockshelters, BE701 and HE614, are both newly recorded sites. Both are along Tebo Creek. Site 23BE701 is a very small shelter on the east side of the creek. Although it appeared undisturbed, it was clear that debris density was light. The deposits are about 24 cm thick. Site 23HE614 is also small and shows extensive recent Euro-American disturbance in the form of both graffiti and presence of recent materials such as glass and rifle shells. Its deposits appear no more than 15 cm thick.

All three shelters (23HI246, 23HI247, and 23HI248) recorded out of the selected transects were originally recorded during Stage 3 survey. All were previously extensively tested and reported during the Cultural Resources Survey (Chomko 1976: 70-153; Roper 1975: 22-23).

PUBLIC USE AREA SURVEY

The Public Use Area survey recorded 330 prehistoric sites, described in Table B-18. Most were open sites (n=315-95.4%), 8 were shelters (2.4%), the other 7 were mounds (2.1%). Ground cover percent, type, and incidence of shovel testing are summarized in Table B-19. It is possible that some land listed was due either to misunderstanding of definitions by surveyors or regrowth or brush and weeds on lightly cleared land.

As with the Stage 3 survey, a relationship does exist between the amount of ground cover and the kind of ground cover (Table B-20), and between amount of ground cover and incidence of shovel testing (Table B-21). These relationships are even stronger than during Stage 3 survey, this in spite of the fact that even sites easily recorded in light ground cover were frequently shovel tested to determine the depth of the deposits.

Unlike Stage 3 survey, rather few open sites had been previously recorded. Again, the revisit afforded the opportunity for monitoring site appearances.

Six of the seven rockshelters are small with light debris densities. Usually no more than a few flakes were observed. All have shallow deposits and have very little, if any, research potential. However, the seventh, 23SR115, Cedar Point Rockshelter, is rather more prominent. Of the seven rockshelters, it is the only one previously recorded. The original record was made in 1959, at which time three points, other lithic artifacts, five sherds, bone, and ochre were collected. These were described by Keller (1964). It was visited during the Cultural Resources Survey in 1976 at which time it was within one of the Stage 2 transects. At that time, a number of flakes were collected. The shelter is large, but with shallow deposits. It appears badly disturbed and its walls are covered with graffiti.

Three of the mounds are in the Harry S. Truman State Park. Two of them, 23BE120 and 23BE666, are within a few meters of each other, and are on the bluff overlooking the South Grand River. BE120, previously recorded, is the smaller of the two. It has not been formally excavated, but has been largely destroyed by potting. BE666, however, the larger of the mounds, is not badly damaged. BE911 is in another part of the park. It was originally a fairly large cairn structure but has suffered extensive potting.

One of the other mound sites, 23BE6, is in the Fairfield Public Use Area. This is the Fairfield Mound Group and is composed of four mounds. All were excavated in and are reported by Wood (1961: 26-38; and 1967: 9-45).

Two mound sites were reported in the Long Island Public Use Area on the South Grand River. 23HE684 is previously unreported. It is comprised of three structures (Fig. 11) and appears to be totally undisturbed. The mound group is located on a ridgespine within a tight meander loop of the S. Grand River. Two of the cairns are of limestone slabs, the third seems to be composed of smaller pieces of limestone mixed with humic material. The other mound site, 23HE148,

FIGURE NOT AVAILABLE

Figure 11. Site 23HE684.

is the Mt. Ilo Cairn originally reported in 1962 and excavated in 1967 by Falk and Lippincott (Falk and Lippincott 1974: 54-57).

The final mound recorded during Public Use Area survey is 23HE890 in the Sugar Camp Hollow Public Use Area. It is a single rock cairn structure on a ridgetop overlooking the Osage River. It has been extensively disturbed.

OTHER SITES

The Powerline survey recorded 6 sites. All are open sites (Table B-22), mostly recorded (5 of 6) under 90-100% ground cover conditions and via shovel testing.

Coincident with the part of the Public Use Area survey, an evaluation of the availability of cherts in the areas immediately surrounding a number of sites, particularly ones that had received extensive excavations, was assessed. This evaluation is described separately by J. H. Ray (Vol. II, Pt. 4). During the course of that survey, however, 29 previously unrecorded sites were encountered and recorded. Their characteristics are listed in Table B-23. All but one are open sites.

Isolated Finds

It is often the case that the surveyor encounters single artifacts unaccompanied by any other remains of human occupation of a locus. Such isolated finds may indeed have significance for the study of the entire range of past human activity in an area. Because of this potential, it became a practice during the continued survey of the Truman Reservoir to record such isolated finds, but use a separate designation. Thus, a series of IF numbers was created.

A total of 44 isolated finds were recorded during the survey reported here: 11 within selected Stage 3 transects, 3 found during Stage 3 survey but not in selected transects, and 30 during Public Use Area survey (Table B-24).

Historic Sites

By historic sites in this report is meant exclusively historic Euro-American sites. Although the Truman Reservoir area is known to have been used by several historic Indian groups, most notably the Osage, no historic Indian sites are known in the reservoir area itself. The villages of the Osage tribe are indeed along the Osage River, but are in Vernon County, upstream from the area directly impacted by

Truman Reservoir (Chapman 1959). Village and camp sites of other historic tribes, including Kickapoo, Osage, and Shawnee are reputed to be present, but not a single locus has ever been confirmed either by this survey or other preceding investigations, this in spite of purposive searches.

The archaeologists working on the Cultural Resources Survey had not recorded historic sites since both a historian and an architectural historian were working on the project. During the Stage 3 and Public Use Area surveys performed under this mitigation contract, the location of historic sites was recorded. Sites were assigned numbers from a separate series for historic sites, clearly identified as such by an H following the sequence number. [Note: The State of Missouri presently has no numbering system for historic sites. The present numbers therefore pertain exclusively to the Truman Reservoir sites.]

A total of 9 historic sites was located during the two surveys: 2 during Stage 3 within selected transects, 5 during Stage 3 but outside of selected transects, and 2 during Public Use Area survey (Table B-25). Each is briefly described here.

Site 23BE1H is a scatter of debris in the upland overlooking the Pomme de Terre River. The surveyor who recorded it assessed it as dating at least from the 1880's, but occupied until very recent times. The site has been cleared with a bulldozer. No features remain, leaving the site with little research potential.

Site 23BE2H is in better condition. It is on a ridge overlooking the Little Pomme de Terre River. A portion of a limestone and log foundation remains (Fig. 12) with the remains of a possible well or cellar remaining nearby. Associated debris is lightly scattered. The site is clearly 20th century.

Site 23BE4H is the remains of a farmstead that has been cleared. The site shows on the Leesville 7.5' U.S.G.S. quadrangle. It was recorded during the architectural survey (Linderer 1977). A small quantity of historic ceramics and other historic material is scattered around the foundations.

Site 23BE5H is in the South Grand Point Public Use Area. It is not shown on the quadrangle map. It is on a knolltop overlooking the South Grand River and consists of the foundations of outbuildings, root cellar, and a well. A scatter of stoneware, whiteware, glass, etc. surrounds the buildings. It is sitting atop prehistoric site 23BE872.

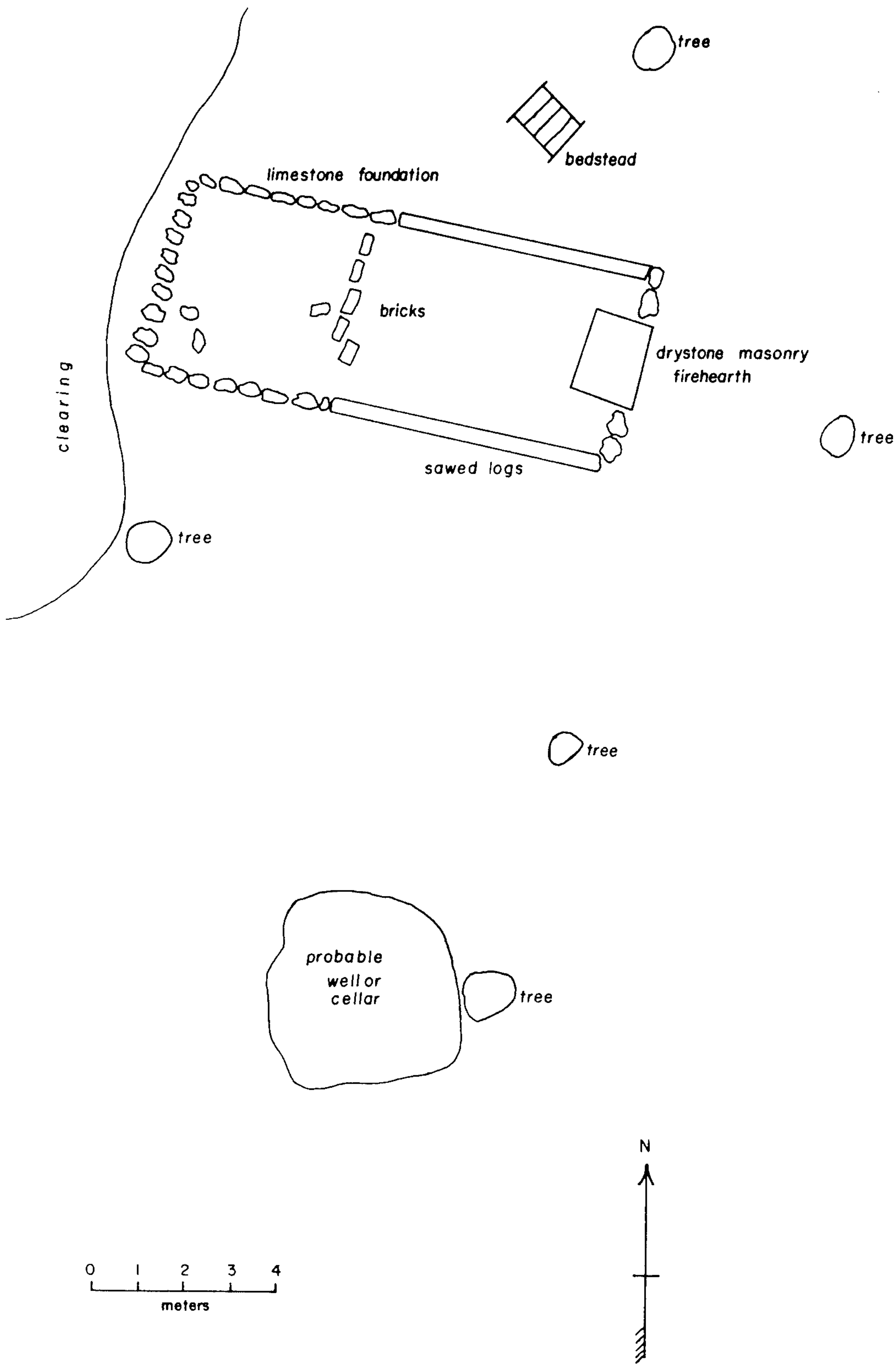


Figure 12. Site 23BE2H.

Site 23SR1H is the remains of a house, a barn, and several outbuildings. It shows on the U.S.G.S. Iconium 7.5' quadrangle. It overlooks Weaubleau Creek and is just within Corps of Engineers acquisition area. It is almost certainly 20th century.

Site 23SR2H is another recent farmstead site. It overlooks Bear Creek and is shown on the U.S.G.S. Iconium quadrangle. Two foundations remain with a light debris scatter.

Site 23SR3H was assessed by the surveyor as an "average American fishing camp site." It is open but consists of a fire pit, worm holes, trash, chairs, restroom facilities, and refuse scattered about. It is next to Bear Creek and is undoubtedly contemporary. Although it presently has little research potential, it would be interesting to visit this location sometime in the future to see what sorts of remains are left from an obviously ephemeral, but still well provided, occupation.

Site 23HE1H is in the Bucksaw Public Use Area. It is the foundation of a historic house structure with frame construction. The site shows on the Leesville 7.5' U.S.G.S. quadrangle. It is estimated to have been of mid-20th century construction.

CHAPTER 5

THE COLLECTIONS

Ceramics

The entire corpus of ceramics collected during the 1978-1979 surveys is thirty-seven sherds, most of these from a single site (Table 14). This total includes two rim and thirty-five body sherds. All sherds have coarse paste and limestone temper and are more fully described by Tippitt (Vol. II, Pt. 2).

TABLE 14

Ceramic Distribution in the Survey Collections

Site No.	Rim Sherds	Body Sherds
23BE681 - Area A	1	24
23BE681 - Area B	1	9
23BE699	0	1
23BE829	0	1

All three ceramic sites are on Little Tebo Creek. Whether this is a result of sampling accident, preservation, or actual ceramic occurrence is presently unknown.

Lithics

PROJECTILE POINTS

All projectile points collected during the 1977-1979 investigations in Truman Reservoir have been described as a single collection (Goldberg and Roper, Vol. II, Pt. I). Five hundred and two of the 1,183 points (42.4%) described in that section were collected from 206 sites recorded during the Stage 3, public use area, powerline or chert surveys. Tables B-26 and B-27 record the frequencies and totals in the survey collection of each of the described point types.

Unlike either the Cultural Resources Survey or Downstream Stockton Survey (Roper 1977a, 1977b), the surveys performed under this contract had the advantage of being able to draw on the chronological data derived from both stratigraphy and absolute dates at tested and excavated sites.

Whereas in prior surveys it has been necessary to rely exclusively on cross-dating and comparisons with Rodgers Shelter, the upper part of which is compressed and was poorly dated until recently, it is now possible to compare survey specimens with a considerably better dated point sequence. Each of the projectile point descriptions summarizes chronological information, both from the Truman excavations and from reports of investigations in areas surrounding Truman. Comparison of data presented in these descriptions suggests that thirteen groups, loosely construed as components, may be recognized in the survey collections. These groups and their diagnostic point styles are as follows.

Dalton — Points in this component include Dalton, Hardaway, and what has been called here a Dalton variant, resembling the Hardaway blades described by Coe (1964: 64) in North Carolina. Dates for Dalton material in the Southeastern U. S. generally fall between 10,000 and 9,000 years ago (Chapman 1975).

Plano — This is here represented only by a few specimens of Plainview points, although an occasional Scottsbluff (Wood 1957: 10; Collins, et al. 1977: 32) and several other Plano forms (Agate Basin, Angostura; Collins, et al. 1977: 33-34) have been collected in the general Truman vicinity. Plainview points are a Southern Plains contemporary of the southeastern Dalton material.

Rice Lobed — Represented solely by Rice Lobed points. As discussed with the projectile point type description, these points rather resemble a variety of Kirk points and generally fall within a time period (9,500-8,600) that closely corresponds to Kirk (cf. Chapman 1976).

Graham Cave-Big Sandy — Comprised of the eponymous point types, both of which are side-notched forms. These forms fall within the Early Archaic period and are slightly later than Dalton.

Middle Archaic side-notched — This group contains specimens in Categories 368, 369 and 370. These categories are comparable to various Plains Archaic classes, and date to approximately the Hypsithermal or Middle Archaic.

Jakie Stemmed — Two categories, 371 and 372, were considered to represent variants on Jakie Stemmed points. Extrapolation from outside stratigraphic and radiometric data suggests a Middle Archaic temporal provenience.

Late Archaic A — Categories in this group include Sedalia, Etley, Nebo Hill, Turkey Tail, Stone Square Stemmed and Smith. These styles form a single group here by virtue of commonalities in technology and their frequent co-occurrence at sites along the southern border of the Prairie Peninsula.

Late Archaic B — Categories include Afton, Table Rock Stemmed, and numbered categories 312, 336, 338, and 355. These categories have all been best recognized in dated Late Archaic context. They do not, however, share the technological commonalities of Late Archaic Group A, and only occasionally occur at the same sites.

Late Archaic-Woodland Transition — Points in the categories placed in this group represent categories 302, 306, 315, and the newly named Truman Broad-Bladed. Dates for these specimens overlap into both the Late Archaic and the Woodland.

Contracting Stemmed — This group contains Gary and Standlee points and the category of general contracting stemmed. Dates for these complexes may range into the Late Archaic but surely persist well into Woodland times. Since these forms rarely co-occur with other categories, they have been placed in a separate component.

Generalized Woodland — Points in this group fall within categories 303, 309, 314, 320 and 321. Available temporal data suggest that these forms were in use during the Woodland period. They are not, however, associated with Cooper-Hopewell forms, nor with the later clearly Late Woodland forms.

Cooper-Hopewell — Points in these categories fall within the Cooper (Categories 310 and 311) and Snyders types. They were in use during the Middle Woodland period and are occasionally associated with ceramics in the Truman Reservoir.

Late Woodland — Points in this category include Category 305, Rice Side-Notched, Scallorn, Reed, Fresno, Huffaker and unclassified arrow points. These types may occur with ceramics and are well represented in mounds of the Fristoe and other burial complexes (Goldberg 1980; Wood 1967).

Table B-28 in the tables volume identifies the components present at each of the 176 sites at which identifiable components were recorded. A total of 288 separate components were identified. Their distribution is summarized in Table 15.

OTHER LITHICS

The survey collections also contain a large number and variety of stone tools other than projectile points. These were analyzed in accordance with procedures established in the Lithics Laboratory and outlined in the Lithic Laboratory Procedures Manual (Reagan, et al. Vol. II, Part 4). However, while the full set of tool and debris categories defined in that manual are important for technological studies,

TABLE 15

Distribution of Components at Survey Sites

Component	No. of Sites
Dalton	5
Plainview	1
Rice Lobed	5
Graham Cave-Big Sandy	8
Jakie Stemmed	4
Middle Archaic Side-Notched	9
Late Archaic A	44
Late Archaic B	31
Late Archaic/Woodland Transition	12
Contracting Stemmed	49
Generalized Woodland	22
Cooper-Hopewell	48
Late Woodland	50

they are too numerous for efficient characterization of the survey collections. For the present descriptive purposes, they are here collapsed into thirty-two tool and debris categories that are similar to those used in the description of the Downstream Stockton Survey collections (Roper 1977b: 58-77) and reflect the basic morphological and technological dimensions of variability in the collections. Designations and basic definitions of categories are as follows:

Circular bifaces – bifacially worked chert artifact edges not sharply beveled; lateral margins do not converge to points at either end, nor are they parallel to one another.

Rectangular bifaces – bifacially worked chert artifact; edges not sharply beveled; lateral margins do not converge to points at either end, but are parallel to one another; both ends are squared.

Bipointed biface – bifacially worked chert artifact; edges not sharply beveled; lateral margins converge to points at each end.

Triangular biface – bifacially worked chert artifact; edges not sharply beveled; lateral margins converge to a point at one end; the other end is squared.

Amorphous or general biface – bifacially worked chert artifact; edges not sharply beveled; lateral margins generally converge to a point at one end; the other end is largely undefined.

Ovate biface – bifacially worked chert artifact; edges not sharply beveled; lateral margins are parallel; both ends are rounded.

Pointed end segments – bifacially worked chert artifact; both lateral margins are truncated by the same break; remaining portions of the lateral margins converge to a point.

Squared end segment – bifacially worked chert artifact; both lateral margins are truncated by a single fracture; remaining portions of lateral margins are parallel, the remaining end is squared.

Rounded end segment – bifacially worked chert artifact; both lateral margins are truncated by a single fracture; remaining portions of lateral margins are parallel; remaining end is rounded.

Irregular end segment – bifacially worked chert artifact; both lateral margins are truncated by a single fracture; remaining portions of lateral margins are parallel; remaining end is amorphous.

Biface fragment – bifacially worked chert artifact; artifact is broken other than transversely.

End scraper – chert artifact is either unifacially or bifacially worked; tool possesses a steeply beveled retouched edge perpendicular to the long axis.

Side scraper – chert artifact is either unifacially or bifacially worked; tool possesses a steeply beveled retouched edge or edges parallel to the long axis.

Other scraper – chert artifact is either unifacially or bifacially worked; tool possesses a steeply beveled retouched edge or edges neither perpendicular nor parallel to the long axis.

Piercing implements – this category consists of miscellaneous tools described in the Lithic Laboratory Procedures Manual as perforators, drills, augers or burins.

Axe/adz – bifacially worked chert artifact; edges not sharply beveled but may be steeply sloped; lateral margins are parallel with one rounded and one squared end.

Hammerstone – may be of chert or any other type of rock; generally fist sized cobble; remains of battering evident.

Groundstone – raw material other than chert; artifact fashioned via grinding or pecking; form usually amorphous.

Debitage was not systematically collected during the Stage 3 or public use area surveys; however, shovel tests inevitably produce debris. It may be difficult at times to determine the status of an item that is covered with dirt, and for a variety of other reasons, debitage does occur in the collections. A small series of categories are used to tabulate the debitage in the survey collections. These are defined as follows.

Modified cortex flakes – cortex present on both striking platform and entire dorsal face; retouch or alteration present on one or more edges.

Modified primary flakes – cortex present on platform but not on entire dorsal face; retouch or alteration present on one or more edges.

Modified secondary flake – no cortex on platform, some cortex present on dorsal face; retouch or alteration present on one or more edges.

Modified tertiary flake – no cortex on either striking platform or dorsal face; retouch or alteration present on one or more edges.

Unmodified cortex, primary, secondary and tertiary flakes - same as above, except no retouch or alteration is present on edges.

Blade - length/width ratio is $\geq$ 2.

Flake fragments - any of the above but with one or both ends missing.

Cores - multifaceted chert artifacts; showing signs of intentional modification.

Shatter - variable sized pieces of chert; angular, often with sharp edges, having been broken along more or less straight cleavage planes; no striking platform or bulb of percussion, either positive or negative.

Tables B-29 and B-30 present the tool data and debitage data, respectively for the sites newly recorded during Stage 3 survey. Tables B-31 and B-32 present the tool data and debris data, respectively, for sites newly recorded during the Public Use Area survey. Tables B-33 and B-34 present these same data for sites recorded during the powerline and chert surveys.

APPENDIX A

A COMPARISON OF THE EFFICIENCY OF SURVEYS

During the course of the Cultural Resources Survey, the mitigation contract, and purchase orders associated with these contracts, the University of Missouri has conducted surveys in several easily delimited units: Stage 1 (included lower Pomme de Terre arm), Stage 2, Stage 3, Downstream Stockton, Public Use Area, powerline, and borrow area and relocation. The latter two (powerline and borrow area and relocation) were in small parcels of land that were scattered over the landscape, and Stage 1 was a general reconnaissance without subsequently introduced controls. The Stage 2 and 3, Downstream Stockton, and Public Use Area surveys were all well controlled, covered sufficient area, and were of sufficient duration to make a comparison of their efficiency not only meaningful but of possible interest.

Daily Survey Logs (later renamed Survey Unit Summaries) were available for all these surveys. Among other things, the name of the crew chief and all other members of the survey crew for the day were recorded. It was therefore a simple matter to tabulate the number of person-days expended in each survey. Days on which a crew was rained out or for some other reason was unable to go into the field were not counted; days on which crews did go into the field but experienced some sort of difficulty such as discovering roads and bridges changed or vehicles getting stuck were considered the facts of life of fieldwork and were counted. Tabulations were made for each survey individually. Calculations of acres surveyed during each of these surveys were available from reports of the Stage 2 (Roper 1977a) and Downstream Stockton (Roper 1977b) surveys, and in this report for the Stage 3 and Public Use Area surveys. Calculation of average number of acres surveyed per person per day could then be made (Table 16).

The outstanding result of these calculations is the remarkable consistency of survey rate during Stage 2, Downstream Stockton, and Public Use Area surveys, and the comparative inefficiency of the Stage 3 survey. No two of these surveys were exactly alike. Stage 2 survey was done by 2 person survey crews and was in long transects that could take up to several days to survey. The Downstream Stockton Survey was in large areas, was done by a crew that varied

TABLE 16

Survey Coverage Rates for 4 Surveys

Survey	No. Acres	No. Person-days	
Stage 2	16199.13	623	26.00
Downstream Stockton	2240	91	24.62
Stage 3	6129.83	434	14.12
Public Use Area	13556	588	23.05

from two to five persons, although usually was three or four, but was on private land and required getting survey permission. Public Use Area survey was also in large areas and used 3 person crews, but required much shovel testing because it was largely in woods.

Two major factors seem to make the crucial difference between these three surveys and the Stage 3 survey. The first of these is size of survey units. The river valleys that are flooded by Truman Reservoir are narrow, often less than one mile wide. Transects running only across the permanent pool are short. At time of survey, they were beginning to flood; thus, the surveyable portions were small and usually took less than one day to survey. A crew was therefore moving frequently, perhaps several times a day, reducing the total land area covered during a day. Use of two-person crews might have partially alleviated this, but the increase in cost-effectiveness would probably have been offset by the necessity to hire a greater proportion of higher-paid crew chiefs, rent more trucks, and buy more gasoline.

The second efficiency-reducing factor was difficulty of access to survey transects. Removing of bridges, tearing up or blocking off of roads, and flooding of parts of roads all conspired to make access to portions of some transects difficult. Attempts to go cross-country, even with 4-wheel drive vehicles, often resulted in vehicles getting stuck (although for sure, this was sometimes a reflection of poor judgment by the driver). A canoe was available and was sometimes used to reach transect segments.

Altogether, these figures suggest that the arbitrary division of low-lying lands into several units determined solely by elevation is not cost-efficient. It is recognized, of course, that the permanent pool portion is likely to present the most access problems by virtue of its imminent land use. This probably only compounds a reduction in efficiency posed by the necessity to move frequently from one parcel of land to another.

REFERENCES CITED

Andresen, Steve
1977 The orienteering book. World Publications, Mountain View, California.

Benchley, Elizabeth, et al.
1981 Rock River, upper Mississippi River, Little Wabash River, lower Wabash River units (I, III-North, and VIII). In Predictive models in Illinois archaeology: report summaries, edited by Margaret Kimball Brown, pp. 1-20. Illinois Department of Conservation.

Binford, Lewis R.
1977 General introduction. In For theory building, edited by Lewis R. Binford, pp. 1-10. Academic Press, New York.

Braithwait, Richard Bevan
1968 Scientific explanation. At the University Press, Cambridge.

Bretz, J Harlan
1965 Geomorphic history of the Ozarks of Missouri. Missouri Geological Survey and Water Resources Vol. XLI.

Butzer, Karl W.
1976 Geomorphology from the earth. Harper and Row, Publishers, New York.

Chapman, Carl H.
1959 The origin of the Osage Indian tribe: an ethnographical, historical, and archaeological study. Unpublished Ph.D. dissertation, University of Michigan.

1975 The archaeology of Missouri, I. University of Missouri Press, Columbia.

Chapman, Jefferson
1976 The Archaic period in the lower Little Tennessee River valley: the radiocarbon dates. Tennessee Anthropologist 1(1): 1-12.

Chomko, Stephen A.
1977 Cultural resources survey, Harry S. Truman Dam and Reservoir Project, Vol. VII: archeological test excavations in the Harry S. Truman Reservoir: 1975. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Clarke, David L.
1972 Models and paradigms in contemporary archaeology. In _Models in archaeology_, edited by David L. Clarke, pp. 1-60. Methuen, London.

Coe, Joffre L.
1964 The Formative cultures of the Carolina Piedmont. _Transactions of the American Philosophical Society_ 54(5) n.s.

Collins, Charles D., Andris A. Danielsons, and James A. Donohue
1977 The Downstream Stockton Study: investigations at the Montgomery Site: 23CE261. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Falk, Carl R. and Kerry A. Lippincott
1974 Archeological investigations in the Harry S. Truman Reservoir, Missouri: 1967-1968. Report to the National Park Service, Midwest Region. University of Missouri-Columbia.

Fitting, James E.
1969 Settlement analysis in the Great Lakes region. _Southwestern Journal of Anthropology_ 25(4): 360-377.

Flannery, Kent V.
1976 Sampling on the regional level: introduction. In _The early Mesoamerican village_, edited by Kent V. Flannery, pp. 131-136. Academic Press, New York.

Grogger, Harold E. and Ival D. Persinger
1976 Soil survey of Henry County, Missouri. U.S.D.A. Soil Conservation Service in cooperation with the Missouri Agricultural Experiment Station.

Haynes, C. Vance
1976 Late Quaternary geology of the lower Pomme de Terre River valley. In _Prehistoric man and his environments: a case study in the Ozark Highland_, edited by W. Raymond Wood and R. Bruce McMillan, pp. 47-61. Academic Press, New York.

1977 Report on geochronological investigations in the Harry S. Truman Reservoir area, Benton and Hickory counties, Missouri. In Cultural resources survey Harry S. Truman Dam and Reservoir project, Vol. X: environmental study papers, pp. 23-32. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Hempel, Carl
1966 Philosophy of natural science. Prentice-Hall, Englewood Cliffs, New Jersey.

Hull, C. Hadlai and Norman H. Nie
1979 SPSS update. McGraw-Hill Book Company, New York.

Hunt, Charles B.
1974 Natural regions of the United States and Canada. W. H. Freeman, San Francisco.

Iroquois Research Institute
1978 Predicting cultural resources in the St. Francis River basin: a research design. Report to the U.S. Army Corps of Engineers, Memphis District.

Joyer, Janet E. and Donna C. Roper
1980 Archaic adaptations in the central Osage River basin: a preliminary assessment. In The Archaic in the prairie-plains, edited by Alfred E. Johnson, pp. 13-23. University of Kansas Publications in Anthropology 12.

Kay, Marvin
1978 Stratigraphic studies at Rodgers Shelter. In Holocene adaptations within the lower Pomme de Terre valley, Missouri, edited by Marvin Kay, Chapter 5. Report to the U.S. Army Corps of Engineers, Kansas City District. Illinois State Museum Society.

Kay, Marvin (editor)
1978 Holocene adaptations within the lower Pomme de Terre valley, Missouri. Report to the U.S. Army Corps of Engineers, Kansas City District. Illinois State Museum Society.

Kellar, Charles M.
1964 Preliminary archaeological reconnaissance and testing. In Preliminary archaeological investigations, Kaysinger Bluff Reservoir, edited by Carl H. Chapman. Report to the National Park Service. University of Missouri-Columbia.

Linderer, Nanette M.
1977 Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. III: architectural survey. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

McMillan, R. Bruce
1971 Biophysical change and cultural adaptation at Rodgers Shelter, Missouri. Unpublished Ph.D. dissertation, University of Colorado-Boulder.

1976 The dynamics of cultural and environmental change at Rodgers Shelter, Missouri. In _Prehistoric man and his environments: a case study in the Ozark Highland_, edited by W. Raymond Wood and R. Bruce McMillan, pp. 211-232. Academic Press, New York.

McNerney, Michael
1979

Monkhouse, F. J. and H. R. Wilkinson
1971 _Maps and diagrams_. Methuen, London.

Morgan, Charles G.
1973 Archaeology and explanation. _World Archaeology_ 4(3): 259-276.

Mueller, James W.
1974 The use of sampling in archaeological survey. _Society for American Archaeology Memoir_ 28.

Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner, and Dale H. Bent
1975 _SPSS_, 2nd edition. McGraw-Hill Book Company, New York.

Piontkowski, Michael R.
1977 Preliminary archeological investigations at two Early Archaic sites: the Wolf Creek and Hand sites. In Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. IX: preliminary studies of Early and Middle Archaic components, pp. 1-57. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Roper, Donna C.
1976 Cultural resources survey, Harry S. Truman Dam and Reservoir Project: the lower Pomme de Terre arm, Pt. II: the archeological survey, pp. 8-40. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

1977a Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. IV: the archeological survey. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

1977b The Downstream Stockton study: the cultural resources survey, pp. 1-143. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

1979 Archaeological survey and settlement pattern models in central Illinois. Midcontinental Journal of Archaeology Special Paper 2, Illinois State Museum Scientific Papers 16.

Roper, Donna C. and Michael R. Piontkowski
1979 Projectile points. In Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. V: lithic and ceramic studies. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Roper, Donna C. and W. Raymond Wood
1975 Research design for the cultural resources survey, Harry S. Truman Dam and Reservoir Project: the archeological survey. American Archaeology Division, University of Missouri-Columbia.

Rudner, Richard B.
1966 Philosophy of social science. Prentice-Hall, Englewood Cliffs, New Jersey.

Strahler, Arthur N.
1964 Geology, Pt. II: quantitative geomorphology of drainage basins and channel networks. In Handbook of applied hydrology, edited by Ven Te Chow, pp. 439-76. McGraw-Hill, New York.

Thomas, David H., Jr.
1971 Prehistoric subsistence-settlement patterns of the Reese River valley, central Nevada. Unpublished Ph.D. dissertation, University of California-Davis.

Thompson, Richard W.
1981 Vermillion River (Embarass River unit V). In _Predictive models in Illinois archaeology: report summaries_, edited by Margaret Kimball Brown, pp. 41-54. Illinois Department of Conservation.

Watson, Patty Jo, Stephen LeBlanc, and Charles Redman
1971 _Explanation in archaeology_. Columbia University Press, New York.

Winters, Howard D.
1969 The Riverton Culture. _Illinois State Museum Reports of Investigations_ 13.

Wood, W. Raymond
1957 Five projectile points from western Missouri. _Missouri Archaeological Society Newsletter_ 116: 10-11.

1961 The Pomme de Terre Reservoir in western Missouri prehistory. _The Missouri Archaeologist_ 23: 1-131.

1967 The Fristoe Burial Complex of southwestern Missouri. _The Missouri Archaeologist_ 29: 1-128.

Wood, W. Raymond and R. Bruce McMillan (editors)
1976 _Prehistoric man and his environments: a case study in the Ozark Highland_. Academic Press, New York.

PART II.

FIELD SURVEYS, 1978-1979

NUMBER 2

BACKHOE SURVEY FOR BURIED SITES

by

Janet G. Joyer

ACKNOWLEDGEMENTS

First, I would like to thank Dr. Donna C. Roper for her confidence in me in allowing me to plan and implement my own research design. Her encouragement and guidance in all stages of the research was invaluable.

I would also like to thank Ms. Peggy Wood, administrative assistant for the project, who performed miracles in overcoming the results of my lack of experience with bureaucratic paperwork. I am deeply indebted to her for cutting through red tape to keep work continuing smoothly, without delay, despite late changes in our plans.

Next, I would like to thank Mark Huntsman, our fearless backhoe operator, who was willing to try anything but always knew in which instances it would be wiser not to try.

Finally, I would like to thank my crew – Leah Allen, Fred Leonard, and in particular Hal Rager – whose after-hours enthusiasm to discuss both theoretical matters and to help with routine lab work lightened the burden of this undertaking.

BACKHOE SURVEY FOR BURIED SITES

by

Janet E. Joyer

INTRODUCTION

The Harry S. Truman Reservoir Archeological Project has carried out an extensive surface survey in the areas to be inundated by the reservoir and in portions of the surrounding uplands. As this survey progressed, however, it became apparent that the data being collected were biased in favor of later sites. A locational study of Archaic sites (Joyer 1977) further suggested that the types of situations in which earlier sites were being recorded were heavily biased and perhaps not even representative of the types of situations in which these sites were preserved.

The work in the Pomme de Terre River valley that preceded the Corps of Engineers funded work of the late 1970's had demonstrated the presence of an extensive Holocene terrace, the Rodgers terrace for its type site, Rodgers Shelter, and the fact that archeological remains could be found deeply buried in this terrace. The work conducted during the cultural resources survey demonstrated that this same sediment unit occurred in all other major valleys of the Osage Basin in this area (Osage, Sac, South Grand) and that buried sites were present in these areas (Piontkowski 1977). Joyer's (1977) study and a later refinement by Joyer and Roper (1980) had described the locational pattern of known Dalton, Early Archaic, Middle Archaic, and Late Archaic sites, but left unresolved a number of questions. For example, the studies noted that Dalton sites were always in major river valleys and very close to the main stream. But the question remained as to whether this was a product of the Dalton settlement pattern or the fact that most Dalton sites had been revealed by the cutting action of the major rivers.

Clearly what was needed was a more systematic study of the buried cultural resources of the reservoir. It was felt that only in this manner could a more reliable model of the earlier occupations of the reservoir be built. Furthermore, concentration on surface sites alone leaves unconsidered the effects of the reservoir on an entire subset of cultural resources. A survey for buried sites would not only collect data to construct a more reliable model of reservoir area occupation, but also allow the presentation of recommendations for management of all cultural resources.

OTHER BURIED SITE RESEARCH

The importance of buried site research has been recognized by other researchers, particularly in the southeastern United States. Coe (1964) developed a hypothesis for increasing an archeologist's probability of finding sites containing stratified levels of human occupation. The thrust of his argument was that under certain conditions depositional factors would tend to preserve the evidence of these sites. For example, a specific situation which would lead to isolated build-ups in the floodplain would be a projecting outcrop of rock, which would cause the formation of a large eddy area during major floods. These areas would promote rapid deposition, thereby preserving sites in their original context.

Chapman (1977) pioneered use of the backhoe as an archeological survey tool in the Tellico Reservoir area of the lower Little Tennessee River valley. His survey technique involved placing backhoe trenches where sites should be found, using floodplain topography as a basis for trench placement. Four types of floodplain situations were predicted to yield sites: (1) immediately below constrictions in floodplains, (2) upstream from constrictions, (3) the lower ends of islands, and (4) the inside of river bends. All four situations were tested at different places in the river valley and did indeed reveal buried Archaic components. However, further testing of the hypothesis showed that buried sites could also be found in places on the floodplain not covered by one of the topo-depositional criteria (Chapman 1978).

Some survey for and testing of buried sites in the Truman Reservoir area had been carried out during the summer of 1977. Field strategy at that time, however, was limited to examination of cutbanks in the reservoir area using foot reconnaissance and canoe access. Sites yielding time-diagnostic material or appearing otherwise significant were tested either by removing the overburden above them, or by excavating a portion of the bank.

ALLUVIAL CHRONOLOGY

The buried sites in the reservoir area lie beneath up to seven meters of alluvium. The alluvial sequence in the reservoir area has been studied extensively. Haynes (1976) identified four alluvial deposits in the lower Pomme de Terre River valley. Of these, only the most recent one, in addition to the modern floodplain, is young enough to contain cultural material.

Terrace T-0, the modern floodplain, began deposition approximately 1000 B.P. This sediment is a dark brown clayey

silt, known as Pippins Alluvium. Very little soil development (mainly Udifluvents) has taken place in this rapidly deposited sediment (Johnson 1977). Only relatively late cultural material (Late Woodland) would be found in Pippins.

Terrace T-1b ("Rodgers Alluvium") was deposited in three episodes between 11,000 and 1000 B.P. This is the sediment in which Archaic cultural material would be preserved. This sediment is a reddish brown clayey silt, is slightly clayier than Pippins Alluvium, and is likely to show more soil development. Soils formed on Rodgers Alluvium are classified as Dystric Fluventic Eutrochrepts (Johnson 1977). Rodgers Alluvium is probably derived from the reworking of loess and older alluvium (Ahler 1973) as well as the erosion of bedrock soil on the watershed. It was deposited at a rate of 0.3 cm/yr between 11,000 and 8000 B.P. Down-cutting, as well as intermittent floodplain and slopewash deposition, occurred between 7800 and 7200 B.P. A period of degradation followed sometime between 6000 and 4000 B.P. during which time colluvial gravel was washed from adjacent slopes onto the T-1b terrace. The period from 4000 to 1900 B.P. was characterized by renewed aggradation. A brief epicycle of cutting and filling occurred between 1900 and 1200 B.P., after which the Rodgers terrace was abandoned by the Pomme de Terre River.

The Rodgers epicycles of cutting and filling may reflect the removal of successive increments of slope soils in response to climatic epicycles. Deposition of lower Rodgers alluvium (T-1b_1) coincides in a general way with deposition of similar sediments between 10,500 and 8000 B.P. at numerous places over the coterminous United States, including Unit B of the southwest alluvial chronology (Haynes 1968), the St. Albans site, West Virginia (Broyles 1966), the Driftless Area of Wisconsin (Knox and Johnson 1974), and the Koster site in Illinois (Butzer 1977). The deposition of Middle Rodgers alluvium (T-1b_2) also coincides with similar units at the same places, but subsequent deposits do not correlate as well due to a variety of factors. Knox (1976) includes correlations to European alluvial deposits and climatic events to emphasize the global aspect of climatic change on fluvial cycles. However, it is not clear precisely how aggradation and degradation are related to the climatic regimes.

The study of the lower Pomme de Terre can be applied to a considerable degree to neighboring river drainages in the reservoir area (and for that matter, to other parts of Missouri). A soil survey by the U.S.D.A. Soil Conservation Service has been carried out in Henry County (Grogger and Persinger 1976), in which the northwest third of the reservoir area is located. Soils on Rodgers Alluvium are here classified within the Verdigris series. This series

"consists of deep, moderately well drained, nearly level soils on first bottoms adjacent to streams. These soils formed in silty alluvium" (Grogger and Persinger 1976). On a general soil map included with the report (ibid.), this series is grouped with the Osage series and mapped as the Verdigris-Osage association.

ENVIRONMENT OF THE RESERVOIR AREA

The Truman Reservoir area is situated on the border between two major physiographic regions, the Ozark Highland to the southeast and the Western Prairie to the northwest. Although this border is manifest in the reservoir area today as a mosaic ecotone, it has constantly shifted through time. This fluctuation has been of a quantitative nature, rather than qualitative. That is, the same particular elements have probably always made up each environmental zone since the end of the Pleistocene, but the sizes of the zones have varied due to climatic changes over the millennia.

The reservoir area, specifically the area around the lower Pomme de Terre River, is composed of five major environmental zones: upland prairie, bottomland prairie, oak barrens, oak-hickory forest, and bottomland forest (McMillan 1976a). The two dominant zones are the upland prairie, consisting of various kinds of grasses, bluestems being the most common, and the oak-hickory forest, dominated by the post oak-black oak association. The upland prairie is the major zone in the western part of the reservoir, and the oak-hickory forest is the major zone in the eastern part (Fig. 1). At present, the oak-hickory forest is moving westward, displacing the prairie grassland. Comparison of Federal Land Office surveys with more recent vegetation studies indicates that this movement is fairly rapid, showing a substantial change even since the mid-nineteenth century (McMillan 1976a: 35).

One of the most dramatic shifts in climate occurred during the Hypsithermal. During this time, climatic fluctuations occurred all over the world, varying in intensity and effect. In fact, pollen studies show that there is a great deal of difference in the manifestation of the Hypsithermal between such close areas as the American Southwest and Central Plains. Some areas, such as the Great Basin region, were unaffected. Studies at Rodgers Shelter (23BE125) indicate that this period of warming and drying began 8200 to 8600 years ago in the reservoir area (McMillan 1976b). This was probably characterized by long, severe summer droughts. This trend gradually peaked and then began to return, about 4000 years ago, to the climatic conditions existing there today.

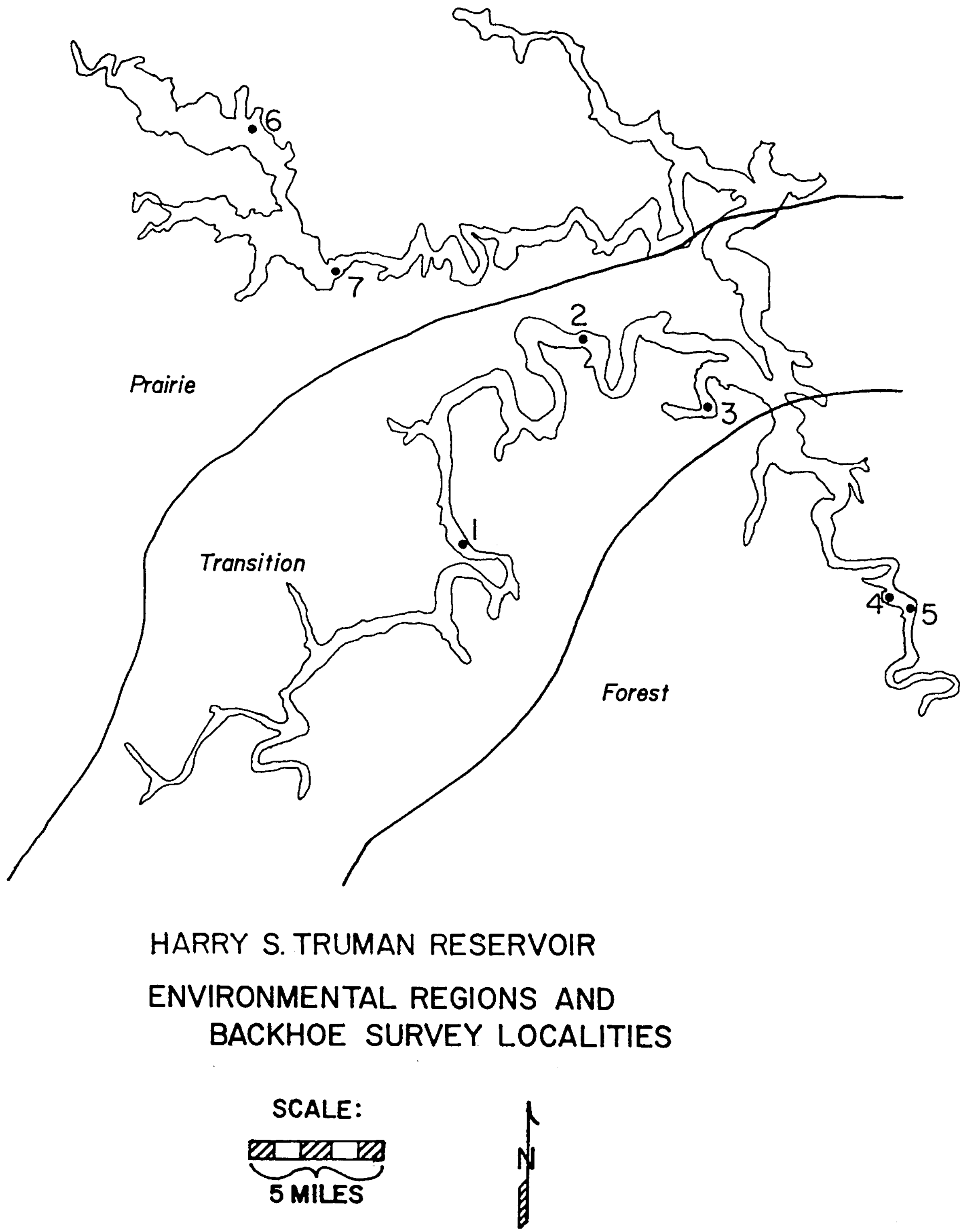


Figure 1. Environmental zones.

THE ARCHAIC PERIOD

The term "Archaic" generally refers to the beginning of post-Pleistocene diversification and exploitation of various ecological niches (e.g., Jennings 1968: 111). At Rodgers Shelter the Archaic has been found to exhibit four distinct patterns of activity and subsistence through time (McMillan 1976b). First, the Dalton period is characterized by a series of small campsites, interpreted to be transient settlements. There was a focus on hunting certain game, especially deer. The Early Archaic period is not well-documented at Rodgers Shelter. However, the two units containing components of this period appear to be the remains of a base camp used primarily for plant processing and manufacturing/maintenance of tools. The Middle Archaic adaptation shows a continued base camp function of the shelter, but a shift in emphasis toward small game and some grassland species, as well as the first "more than incidental" use of mussels. The Late Archaic components indicate a return to a subsistence pattern based primarily on deer hunting, with greater use of aquatic resources.

While Rodgers Shelter provides excellent temporal control, study in the reservoir area as a whole can provide a spatial perspective on Archaic adaptations, by examining locations of sites. Distribution of sites in the area should shed light on the importance of the area during the Hypsithermal, when the rich resource base available in such an area would make it an attractive environment for exploitation. Odum (1955) states:

> Since well developed ecotonal communities may contain organisms characteristic of each of the overlapping communities plus species living only on the ecotone region, we would not be surprised to find the variety and density of life greater in the ecotone (edge effect).

Indeed, Benedict (1978) has found, in a review of 110 dated Altithermal (Hypsithermal) components in the western and central United States, that "ecotonal environments, always popular, were used particularly heavily during the Altithermal" when resources in general were more scarce.

In the Truman Reservoir area, the implications of the Hypsithermal for the distribution and diversity of potential edible plants have been dramatically illustrated by King (1978), and show a drastically reduced edible plant food potential everywhere except within major bottomlands. Given environmental diversity and change, we would expect a corresponding diversity of the archeological record reflecting temporally and spatially changing conditions.

The effects of the Hypsithermal have, in fact, been seen in the prehistoric site distribution patterns in the reservoir area. In a locational study of sites dating to the Middle Archaic period, Joyer (1977) found a tendency for sites of that period to be located in the bottomlands, where the composition of the floodplain forest would have remained stable. The overall distribution of sites in the reservoir area shows a concentration in the southeastern part, where the environment was more habitable. The southeastward shift of the prairie into the Highland caused a drier environment in the northwestern areas.

As the climate fluctuated, then, so did resource availability, and consequently, so did the distribution of human occupation. The locations of sites changed through time on both intra-zone and inter-zone levels. Changes occurred within zones, from higher, more distant localities down into the bottomlands, as well as between zones, with a shift away from the use of the drier prairie in the northwest into the forested highlands to the southeast. However, the inter-zone shift does not appear to be as significant as expected, indicating that the bottomlands of the prairie region provided a sufficient resource base.

RESEARCH DESIGN

Goals

The purpose of this study is to ensure that the older (Dalton and Archaic) sites in the reservoir are as proportionally well-represented in the site inventory as the more recent (Woodland) sites, which are more likely to have been exposed on the surface and recorded during surface survey.

The approaches previously taken in surveys for buried sites have dealt with where sites ought to be found, geomorphologically, on floodplains. As has been seen, this approach has not always been successful (Chapman 1977, 1978) and even when it is successfully applied in one river valley (Coe 1964), the same processes may not necessarily be operating in another river valley, particularly if it varies in age, topography, parent material, or climatic conditions. Since the preservation factors in the regime with which we are concerned have not yet been identified, preservation will be considered random for the purposes of this study.

Instead of the testing of a geological model, then, the primary focus of this study was the testing of a cultural model. Areas were selected for survey on the basis of potential for contributing to knowledge of prehistoric locational patterns.

The study by Joyer and Roper (1980) had observed the following pattern of variability in Archaic site location. Dalton sites were observed in the major but narrow river valleys in the Western Prairie and often adjacent to the river. Early Archaic sites were similarly located. Middle Archiac sites were also in bottomlands but generally in broader bottoms. Late Archaic sites were observed dispersed throughout all major environmental zones.

The finds of Dalton, Early Archaic, and Middle Archaic sites had been fortuitous. A more rigorous study would control for major variables such as physiographic zone (Western Prairie, Ozark Highland) and stream rank (major stream, lesser stream). It was, therefore, decided that the search for buried cultural resources within the reservoir area would be stratified in a manner consistent with that of the surface survey. If diagnostic material was recovered, it would then be possible to address questions about the relative abundance of resources in in different situations throughout the reservoir. Specific questions derived from the previous investigations would include:

1. Are Dalton sites always very close to water?

2. Are Dalton sites mainly along the major streams?

3. Are Dalton sites mainly in relatively narrow segments of river bottoms?

4. Are Dalton sites most abundant in the Western Prairie region?

5. Are there no distinctions between the Dalton and Early Archaic patterns?

6. Are Middle Archaic sites mainly in the bottomlands.

7. Are Middle Archaic sites usually in the central parts of floodplains of all widths?

8. Are Late Archaic sites found with equal frequency in wide valleys, narrow valleys, well into drainage networks as well as on major rivers?

In order to be integrated with the surface survey data so that these questions can be answered, the backhoe data must ultimately be in the same form as those data. The same variables will be measured, but the raw data cannot be interpreted at face-value. There are some limitations to backhoe data-collecting which must be taken into consideration.

First, because the environment in the reservoir area is not necessarily the same now as it was when the subsurface sites were deposited, environmental reconstruction will have to be carried out in some cases before many of the variables can be measured for the buried sites. This reconstruction will include determination of the course of the river at the time of each occupation, the locations of any intermittent water sources, and the topographic setting of the site.

Second, backhoe survey gives a vertical exposure, revealing only a small fraction of each component of the site. Without the horizontal control of a surface site, it is difficult to determine what part of each component is being exposed. This limitation also greatly reduces the chance of finding time-diagnostic materials in the components – and the recovery of those materials is essential to the testing of the locational model!

Third, the shape of a backhoe hole, with its tapering bottom, may favor the discovery of less deeply buried components since a greater volume of fill is removed and a larger profile exposed.

Essentially, in order for the buried sites to be used in the model, there must be a large number of delimited components of specific time periods.

A secondary focus, in addition to the testing of a cultural model, is the development of a methodology for buried site research using the backhoe as a tool that can be used as an example by researchers in other river valleys, regardless of specific alluvial regimes dealt with. This calls for optimum use of the backhoe in two aspects. The first aspect is the development of an appropriate sampling design which takes into account the limitations as well as the benefits of backhoe use. The second aspect is the perfection of a practical field technique which will ensure speedy survey, but with highly accurate data-collection.

Sampling Design

The overall goal in selecting a sampling scheme was to determine which variables would be accounting for site locations. A design was developed which would allow for an analysis of variance to test the effects of the variables. In order for this to be successful, multiple samples must be taken within each stratum. There must be more than a single sample from each stratum to check for variability between sample units within a stratum, to be compared with variability between strata. If variability is within strata, this strongly suggests that the appropriate variables are not yet being considered. If the variability is between strata, the suggestion is that the appropriate variables have been identified. To the extent that within-stratum variability can be reduced, and variability between strata is increased, the variability is becoming increasingly well accounted for. Furthermore, interaction effects must be considered by "nesting" the analysis of variance (Gumerman 1971). Nested sampling designs involve a hierarchy of functions, each order of the hierarchy fitting into the next highest order.

Using variables found to be important in surface survey, eighteen specific situations were derived by nesting four variables. These variables, in descending order were: (1) physiographic region (prairie, transition and highland), (2) stream rank (all streams are either fourth or ninth order), (3) stratum (stratified according to surface survey stratifications, and grouped into two larger groups), and (4) relative width of floodplain (wide or narrow). Eighteen localities were selected for survey, each satisfying the specifications of the derived situations. In some cases, of course, more than one stretch of floodplain fit the requirements for a particular locality. In these cases, non-probablistic sampling methods were used to select from the possiblities. Non-probablistic sampling (or judgmental sampling) is sampling whose reliability cannot be objectively assessed. However, identifying the biases prevalent in decision-making can, in part, explain the subjectivity used. Subjective decisions were usually based on pragmatics. For example, some areas were inaccessible to the backhoe because of inadequate roads. Other areas of floodplain had too limited an extent of T-1b terrace.

Variables not controlled for in the nested design would also be examined. For example, distance to bluff base is an important variable, as it indicates proximity to upland resources. Distance to water is also very important. This variable, however, cannot be measured until after past movements of the river across the floodplain have been determined. Distance to river may be different for each component of a site.

With eleven weeks to carry out this sampling design, a maximum of three days could be spent on each locality, including gaining permission to backhoe still-leased property, the actual backhoeing, mapping the locality, and any environmental reconstruction necessary.

Upon completion of three of these localities, it was decided that this sampling design was inefficient for several reasons. First, in order to determine the actual extent of terrace T-1b, preliminary soil probing had to be carried out at each locality prior to bringing in the backhoe. This was time-consuming. Second, since some of the property was still leased to private individuals, much time was spent contacting the lessees; in a few cases, access was refused. Third, often a locality was found to be completely under water (the permanent pool had started filling), too muddy for backhoe access, or too badly rutted from tree-clearing in the area by the time the backhoe arrived. Fourth, not enough actual backhoeing could be accomplished in two or three days at a locality to obtain a clear picture of relationships of cultural material found. Fifth, the environmental reconstruction necessary at each locality in order to answer the locational questions posed in this research would not be worth the effort when so little cultural material was retrieved.

Therefore, a new sampling strategy was devised which alleviated most of these problems. It was decided to sacrifice preliminary control of locational situations except for the highest level of stratification - physiographic region. The other variables would be examined after completion of localities. Rather than six different localities in each region, the number was reduced to one. In the non-probablistic selection of single localities, criteria were that (1) the locality be large enough to backhoe intensively, (2) the locality be as far downstream as possible since the reservoir was slowly filling and the lower elevations would soon be inaccessible, and (3) the locality have as much previous environmental work done as possible, to minimize the need for more work.

For the forest stratum, localities 4 and 5 on the lower Pomme de Terre River were selected because (1) they are essentially on the same floodplain, across which the river has been moving, although they are presently on opposite sides of the river, (2) the soils and geomorphology of both of these areas had been studied extensively and would provide important background information for this study, and (3) evidence of cultural occupation had reportedly been found during coring by geomorphologists at depths of up to 20' below the surface.

For the transition stratum locality 1 on the Osage River, the first locality surveyed in the original nested

sampling strategy, was selected to be the single intensively surveyed locality in this stratum. Locality 1 was selected because of its expansive T-lb terrace and because of its location directly across the river from two buried sites of Dalton and Early Archaic periods (Piontkowski 1977) tested under a previous contract.

In the prairie stratum, selection of a locality accessible by the backhoe was hampered by tree-clearing, which had caused deep rutting. Finally, two localities on the South Grand River were surveyed by backhoe. Locality 6 was selected for its large T-lb terrace. It was abandoned after only three holes were dug, because of the difficulty encountered by the backhoe in moving about the badly rutted floodplain. Locality 7, slightly downstream was a satisfactory alternative for the stratum, except that the narrow floodplain would limit the possibilities of answering some of the locational questions, such as those pertaining to floodplain width.

Each locality was sampled according to a systematic unaligned scheme. Backhoe holes initially were placed at 40-meter intervals. This was changed to 80-meter intervals almost immediately, so that larger areas could be covered.

FIELD TECHNIQUE

A backhoe operator with a tractor backhoe was employed four days a week for eleven weeks. (The fifth day of the week was used for mapping, survey of areas for potential future backhoe work, and to make up for occasional rain days.) The backhoe had a 13-14 foot reach with five teeth on its bucket

Once the exact placement of a hole had been determined, the backhoe was positioned perpendicularly to the river in most cases, though orientation (in an effort to expose the most informative soil profile) was not particularly relevant with the trench length only four meters. The operator slowly skimmed five- to ten-centimeter levels across the hole, for a length of four- to four-and-one-half meters, and a width of 70 centimeters. As each bucketful was dumped, it was spread out on the ground and delicately separated into manageable clods by the backhoe to facilitate shovel-sorting. Shovel-sorting consisted of breaking the dirt clods apart to look for cultural material. While two or three people were engaged in shovel-sorting activity, one person was watching the inside of the hole while the backhoe was operating, watching for *in situ* cultural material stains in the sediment and anything unusual in the profile.

When the excavation had reached a depth of 2.00-2.50 meters below surface, the backhoe was halted and one wall was cleared and mapped. The extent to which the wall was mapped depended primarily on the amount of cultural material present in the hole. When the cultural material present in a hole was relatively diffuse, with no easily defined cultural layers, or when there was no cultural material at all, a tape measure was dropped from the surface, and the depths of each stratigraphic change were recorded in a column-shaped profile, with brief descriptions of each layer (color, texture, inclusions, etc.). When a profile exhibited one or more cultural layers or had nothing of cultural significance, but particularly unusual stratigraphy which could help clarify the depositional understanding of the locality, one entire wall was mapped. Often, while profile examination was taking place, the backhoe would move on and begin digging the next hole, then return to finish the first one while the second was being examined. This maximized use of the backhoe. With this system, five was the optimum number of crew members.

The furthest reach of the arm of the backhoe forms an arc causing the hole to become narrower with depth. Occasionally, if the water table in an area was particularly high, cave-ins were a problem. However, after the profile was examined and drawn, a hole was never re-entered by a crew member, regardless of its apparent stability. The maximum depth of a hole was 4.0-4.5 meters below the surface.

In addition to daily notes on the progress of the survey, a two-page form was completed for each hole (Fig. 2). This form recorded information as to the exact location of the hole, conditions on the present ground surface at the hold, and the subsurface situation encountered. Most designations on the form are self-explanatory, but a few need explanation:

Stratum — refers to the numbered and named strata which divide the reservoir area for purposes of surface survey. These divisions have been in effect since the beginning of Stage 2 of the Truman Archeological Survey (Roper 1977), and the designation on the backhoe survey forms will help to associate at a glance the locations of buried sites with those sites found on surface survey.

Locality - numerical designations for the particular locality, both the backhoe survey locality number (1-7) and the surface survey field number which consists of the survey leader's initials and the date it was first encountered.

Hole # - indicates the consecutive hole number within a particular locality (hole numbers start with "1" again, for every new locality).

FIGURE NOT AVAILABLE

Figure 2. Form

FIGURE NOT AVAILABLE

Figure 2. continued

Quadrangle — U.S.G.S. 7.5' quadrangle map on which hole is located.

Tract # — refers to real estate tracts mapped and numbered by the U.S. Army Corps of Engineers.

Corps Map # — refers to C.O.E. 10' contour topographical maps.

Landform — either "floodplain" or "terrace" was used in all instances, the former referring to the modern floodplain (T-0) and the latter referring to any of the older abandoned floodplains, usually T-1b.

Position on landform — specifies front (river side) or back (bluff side) and other positioning on floodplain or terrace.

Orientation of hole — general cardinal directions along which hole is oriented.

Cored — indicates whether or not subsurface was probed with a 1.20 meter long soil probe, before backhoeing.

Buried sites indicated — refers to only the buried components. This was often determined later, after closer examination of washed material, and more serious consideration of the total cultural material inventory from the "component."

Depth of cultural material — refers to the depth of the highest cultural material encountered through the depth of the deepest cultural material, whether or not it was one continuous component. Depth was measured in meters below ground surface.

Lithic density — a relative value applied either to separate components within the hole or to the hole in general if lithic material was diffuse. General orientation of flakes was also noted in this section, if it were other than random.

General profile description — pertaining to both the soil and cultural profiles. Since all Rodgers alluvium is reddish brown clayey silt, descriptive terms in the soil profile are all finer distinctions within those categories. For example, "brown" means browner reddish brown; "sandy" means sandier clayey silt.

The common problem of determining whether or not certain material is "cultural" was generally solved using as much as could be squeezed from the context. Because the context was difficult to interpret in most cases, given that such a small

area of each component was exposed, arbitrary criteria had to be assigned and followed. Any object which was unlikely to have occurred naturally in a given location, was considered to indicate cultural activity.

The least ambiguous materials found, of course, were lithic tools and debitage. When a tool was found, its exact provenience was recorded (if possible), and projectile points were photographed *in situ*. All debitage observed was saved, and was usually recorded as occurring within a certain depth range. If debitage occurred in discrete levels, it was provenienced as such. However, when flakes were scattered with no vertical variation in density, arbitrary levels of approximately 40 centimeters were used to provenience the material.

The occurrence of fire-cracked rock was more problematical. All fire-cracked rock found in association with lithic material was saved and provenienced. When not found in a definite cultural context, however, fire-cracked rock was noted, but not saved.

Charcoal was quite common, occurring in a definite cultural context approximately half the time. Charcoal was saved every time that enough was collected to form a large enough sample to be submitted for C-14 dating, regardless of its association with cultural material or lack thereof. Charcoal would be helpful for dating the soils and determining depositional sequence for the overall area.

Finally, burnt earth was a fairly common occurrence, the significance of which is difficult to assess in a non-cultural context. Again, the conditions which cause earth to change color (oxidize and reduce) from fire are common in cultural situations. However, natural causes can also produce the same results. Therefore, burnt earth and some non-burnt soil surrounding it were collected in cultural contexts and generally only noted in non-cultural contexts.

Upon completion of a locality, a site survey form (the form used in surface survey) was completed for each site encountered. Assigning site numbers to groups of holes was problematical indeed. The system devised stated that the occurrence of cultural material at *any* depth in contiguous holes makes those holes part of one site, but only *if* the holes appeared to be geomorphologically related. Components could then be assigned within that site based on depths of material. When a geomorphological relationship was uncertain, separate site numbers were given. When the ground surface was deeply dissected (for example, cut by a gully), sites were given different numbers, as was the practice in surface survey. Interestingly, associations between occurrences of

cultural material in holes was no more straight-forward when the holes were 40 meters apart than when they were 80 meters apart.

The site survey form asks for some information which is irrelevant in buried site survey. However, the form was filled in as completely as possible. At the end of the form, the hole numbers making up the site, and the number of components and their depths were included.

RESULTS – LOCALITY DESCRIPTIONS

Locality 1

Locality 1 (Figs. 1 and 3) is located on the east side of the Osage River, just north of Horseshoe Bend, in St. Clair County. The floodplain is as much as 800 meters wide at this point and extends three to four kilometers along the river. Use of the soil probe before backhoeing indicated that most of the floodplain was T-1b terrace, with strips of T-0 immediately adjacent to the river, and possibly T-1a near the back toward the bluff base. Prominent terrace remnants are oriented due north-south, at an angle to the river, which flows in a northwesterly direction along this stretch.

Locality 1 was selected as the locality for the upper Osage stratum in the original sampling strategy. During this first investigation of the locality, eight holes were dug. These were placed on the first terrace remnant back from the river on a stretch of the floodplain which could be easily accessed by the backhoe.

The cultural material retrieved at this time was meager. One flake was found in hole number 4 near the surface. Much charcoal, some burnt earth and a tiny bone fragment were found in hole numbers 1, 2, 5 and 6 at considerable depth (3.25 meters below surface in holes 5 and 6).

When the sampling design was altered limiting the number of localities within the transition stratum to one, it was decided to return to locality 1. A segment of the river between two intermittent streams for a width as far back from the river as the T-1b extended was selected for survey. It was in this segment that Rodgers alluvium exhibited best its identifying characteristics. Hole placement proceeded in rows along the terrace from one intermittent stream to the other, paralleling the river. Six rows with six to ten holes per row were completed in T-1b. Approximately 200 meters back from the river, the alluvium became quite clayey and dark, resembling terrace T-1a deposits, and no cultural material was being found. Rather than continue in this dubious deposit, it was decided that the remaining time allotted to this locality should be spent on the other side

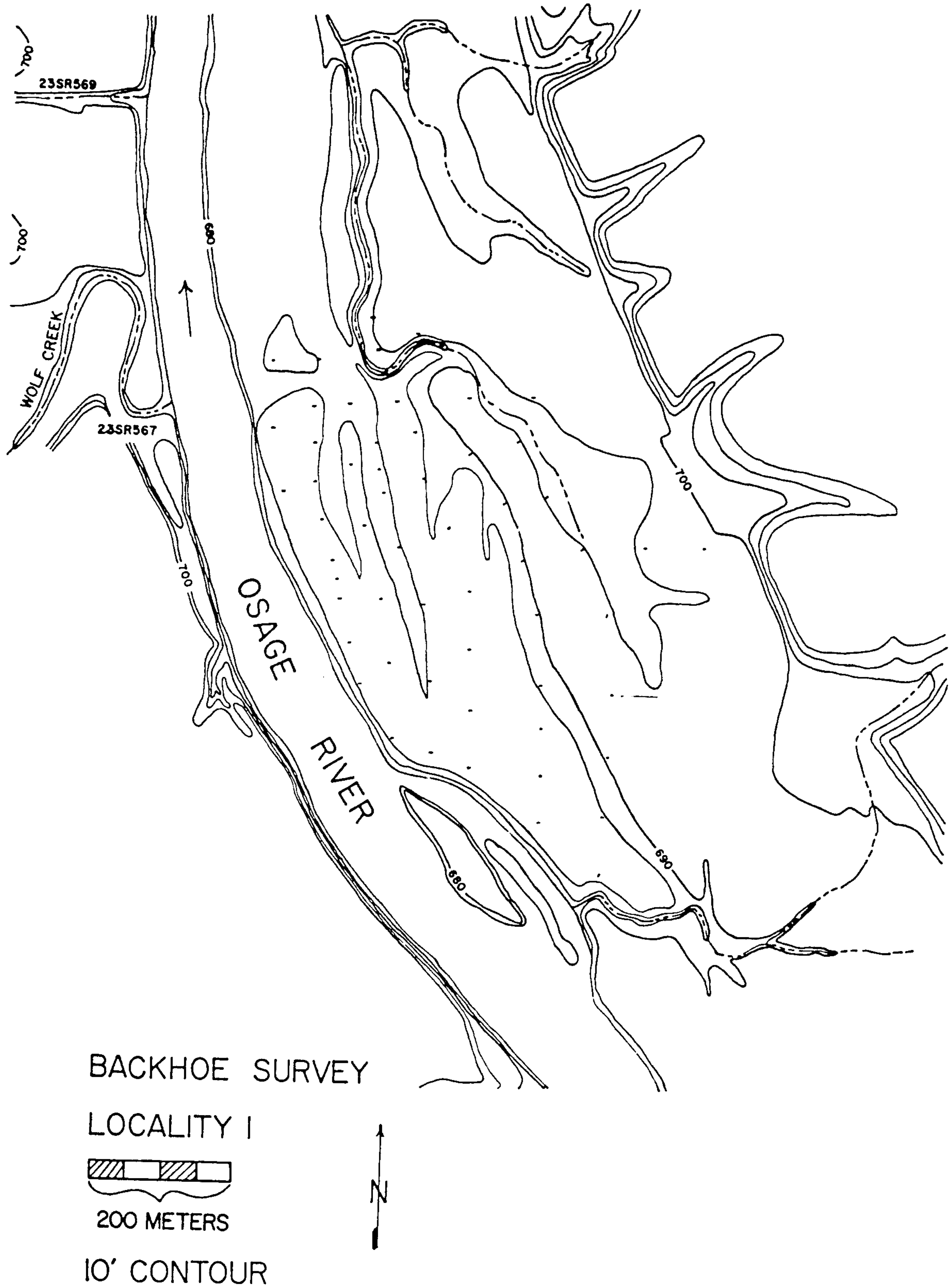


Figure 3. Locality 1

of the northern intermittent stream (tree-clearing during this time had facilitated access to this previously wooded area). Accordingly, four more holes were dug, essentially adding one hole to the northern end of each row. A total of 57 holes were dug in this locality.

Cultural material at this locality consisted of a large variety of items – flakes, cores, fire-cracked rock, bone, bifaces, as well as diagnostic projectile points. Burnt earth and charcoal were observed with regularity at various depths.

Five new subsurface sites were recorded, and four previously recorded sites (with surface components) were re-recorded. See Appendix B for list of hole numbers comprising each site. Of the new sites recorded, two (23SR690, 23SR691) had a diffuse scattering of material; a third (23SR692) had a high concentration of flakes immediately below the plowzone; a fourth (23SR686) had a high concentration of material at .80-1.60 meters below surface including a possible feature, a biface fragment and flakes; and the fifth site (23SR675) yielded Late Archaic style points (Category 355; see Goldberg and Roper, Vol. II, Pt. 1), bone, fire-cracked rock and flakes at a depth of 2.00 meters. Site 23SR675 was recommended for testing, which began immediately (see Hanson, Vol. I). The backhoe aided in overburden removal in four blocks: two around hole numbers 20 and 31, one between the two holes, and a fourth 20-22 meters northwest of the other three.

Of the previously recorded sites, one (23SR468) was strictly in the plowzone; one (23SR469) was diffuse but deeply buried (1.60-2.00 and 2.85-3.00 meters below surface), the cultural material of which was primarily white Burlington chert. The third site (23SR465) was extensive, with consistent deposits of cultural material at .80-1.00 meters below surface. The fourth site (23SR504) consisted of three distinct occupation horizons with an abundance of lithics including a projectile point. This site was recommended for testing and two test units were subsequently dug (see Tippitt Vol. I). Distribution as well as orientation of material at this locality indicated that several of the sites had undergone considerable turbation after deposition.

The terrace sequence at this locality is relatively straightforward. Immediately adjacent to the river is dark Pippins alluvium. Slightly higher and further from the river is lighter reddish brown Rodgers alluvium (the facies change between these two sediments is gradual). Higher yet and 150 meters from the river is a more distinct facies change into the dark greenish grey clayey Boney Spring deposit (T-1a). Backhoe survey did not extend into this deposit, although a long trench was dug by the backhoe

extending hole 48 back away from the river to expose the Rodgers/Boney contact. T-la was abandoned by the river at about the same time as the extinction of Pleistocene megafauna (Saunders 1977). However, to date no archeological material has been found in that deposit. Had more sites been tested at Locality 1, and had those that were tested yielded more diagnostic material, the trench would have been extended to the river, for stratigraphic control among the sites.

The sediments at Locality 1 are very homogeneous over the terrace. The most dramatic variation is seen in low areas where the reducing environment has turned the alluvium a bluish color and the iron has precipitated out in orange chunks. In most cases, there is no sediment change even in areas of high lithic concentration.

Locality 2

Locality 2 (Fig. 4) was deep surveyed with the backhoe under the first sampling design, as the locality for the lower middle Osage stratum. It is located on a wide floodplain on the north side of the Osage River, in Henry County, approximately 32 kilometers downstream from Locality 1.

Eight holes were dug at this locality. The holes were situated in two rows, parallel to the river on terrace remnants one to two meters above the surrounding ground surface.

Cultural material consisted of fire-cracked rock, flakes (one utilized) and a core. Three sites were designated based on the distribution of this material. One site (23HE629) has two components. Another site (23HE631) is a plowzone site. The third (23HE630) has material scattered at several depths. No diagnostic material was found. The sediment in all holes at this locality was a homogeneous reddish brown clayey silt. No test excavations were carried out at this locality.

Locality 3

Locality 3 (Fig. 5) is located on Hogles Creek. Selected under the first sampling design, this locality was one of three localities surveyed in the prairie stratum. Five holes were dug and two sites were recorded. Site 23BE759 is a surface site, and Site 23BE760 yielded a single flake at 1.60 meters below the surface. Holes were dug in two rows at a slight angle to the river, following the tops of terrace remnants. Sediment at this locality was the characteristic T-lb sediment, although darker brown than "typical Rodgers alluvium." Some holes exhibited oxidized sediment (greyish with orange particles).

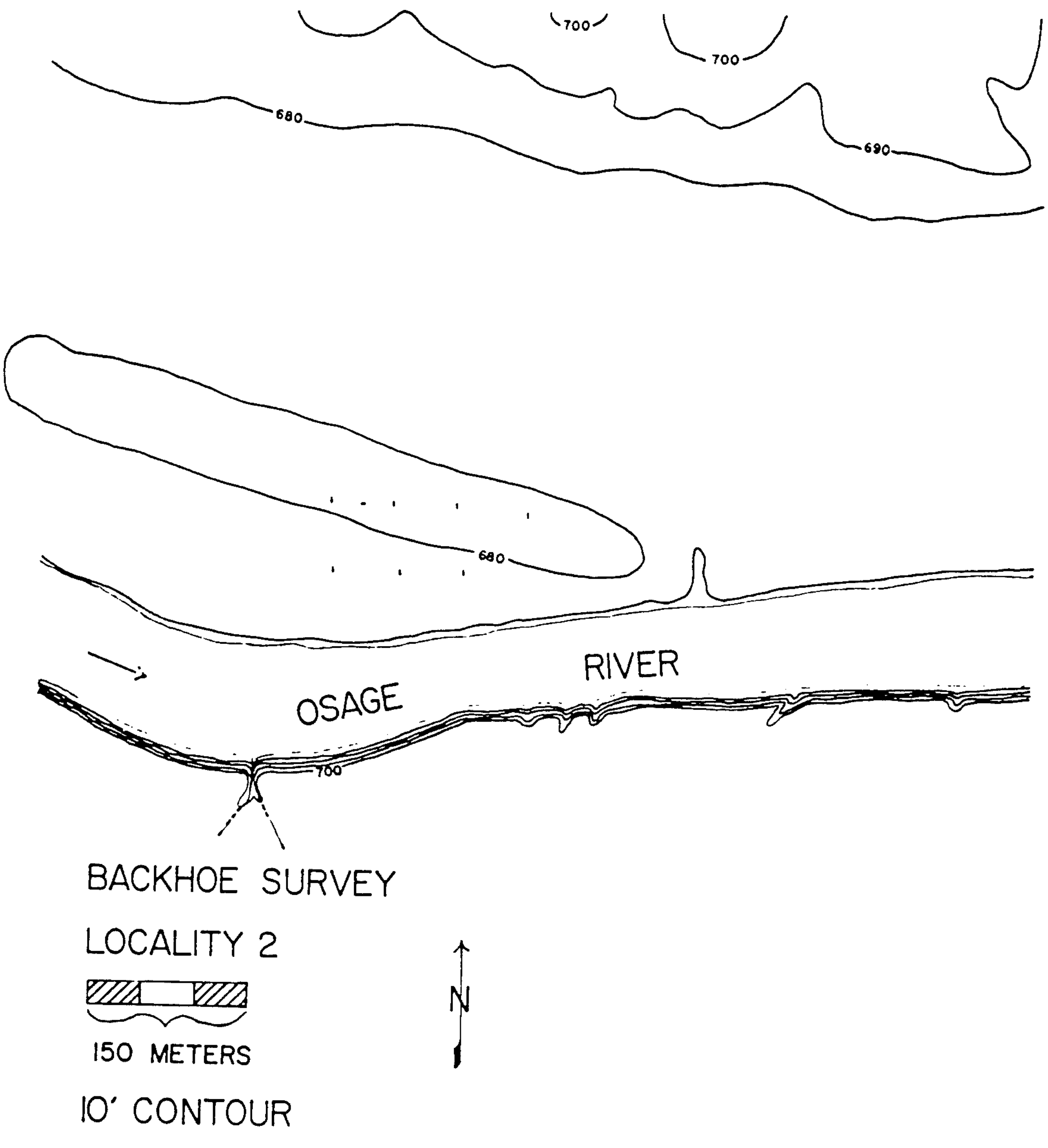


Figure 4. Locality 2

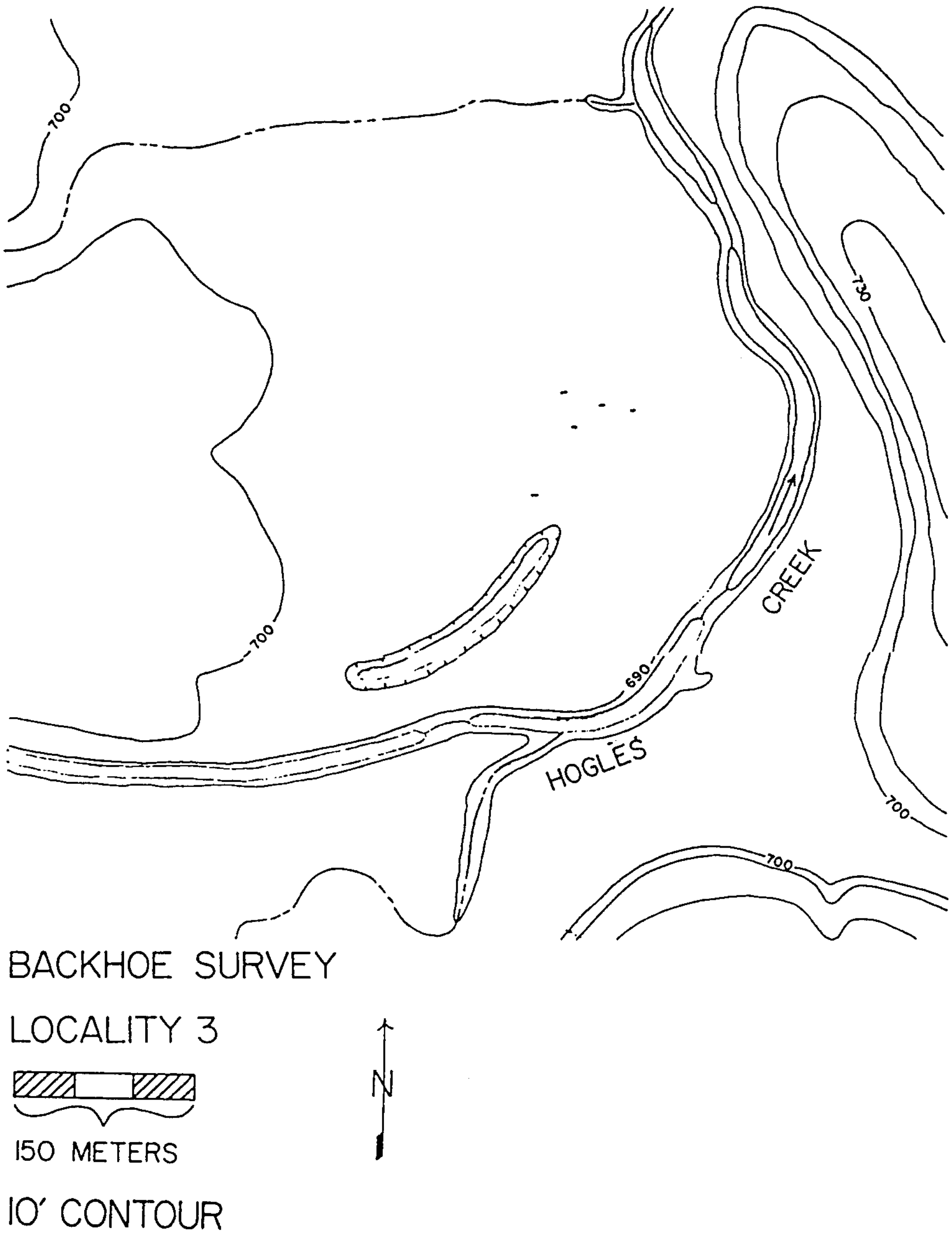


Figure 5. Locality 3

Locality 4

Locality 4 (Fig. 6) was the first locality backhoed in the forest stratum. The soils and terraces in much of the area included in the forest stratum had been mapped by Johnson (1977) and Haynes (1977). The selection of this locality was based primarily on the process of elimination. Other stretches of floodplain were ruled out for various reasons, such as inaccessibility by the backhoe or inadequate amounts of terrace T-lb. Haynes had found a flake at this locality at a depth of 20'.

Eighteen holes were dug at this locality. One site at the locality (23BE474) had already been recorded. It was re-recorded at this time, with the discovery of densely concentrated buried material to a depth of 2.88 meters below surface. Most of the flakes in hole number 8 were not horizontally oriented, and there was no pattern to their orientation. Three new sites were found: 23BE761 and 23BE762, each with three buried components; and 23BE763, extending over seven holes with possibly as many as six components. Material was diffuse. Burnt earth and charcoal were abundant. It was at this site that cultural material was recovered in core samples by the geomorphologist. With the backhoe it was not possible to reach the depth at which that flake was found. Charcoal was observed in almost every hole. Only when the charcoal was concentrated in a distinct layer was it considered part of a site. No diagnostic material was found at any site in this locality.

This locality is situated at the lower end of an abandoned meander loop of the Pomme de Terre River. Rodgers alluvium was deposited as the channel filled in. The surface contour of the T-lb terrace is basically flat, although with a gradual slope upwards to the west. The sediment throughout the locality is standard Rodgers Alluvium. (The availability of a soils map for this locality speeded up survey.) In most holes, the texture became sandier with depth, and the color became lighter, often with some white mottling. In two holes, numbers 9 and 13, the sediment exhibited a blocky structure and was slightly darker in color.

Locality 5

Locality 5 (Fig. 6) was located across the Pomme de Terre River from Locality 4 and immediately south (upstream). The locality was bounded on all sides by bluffs and steep hills. All of the sediment on the entire terrace was Rodgers Alluvium. Therefore, the goal at this locality was to survey the entire extent of the terrace. The area was chosen partly because of its close proximity to Locality 4. The combination of the two localities would provide thorough coverage of that segment of the Pomme de Terre. The area

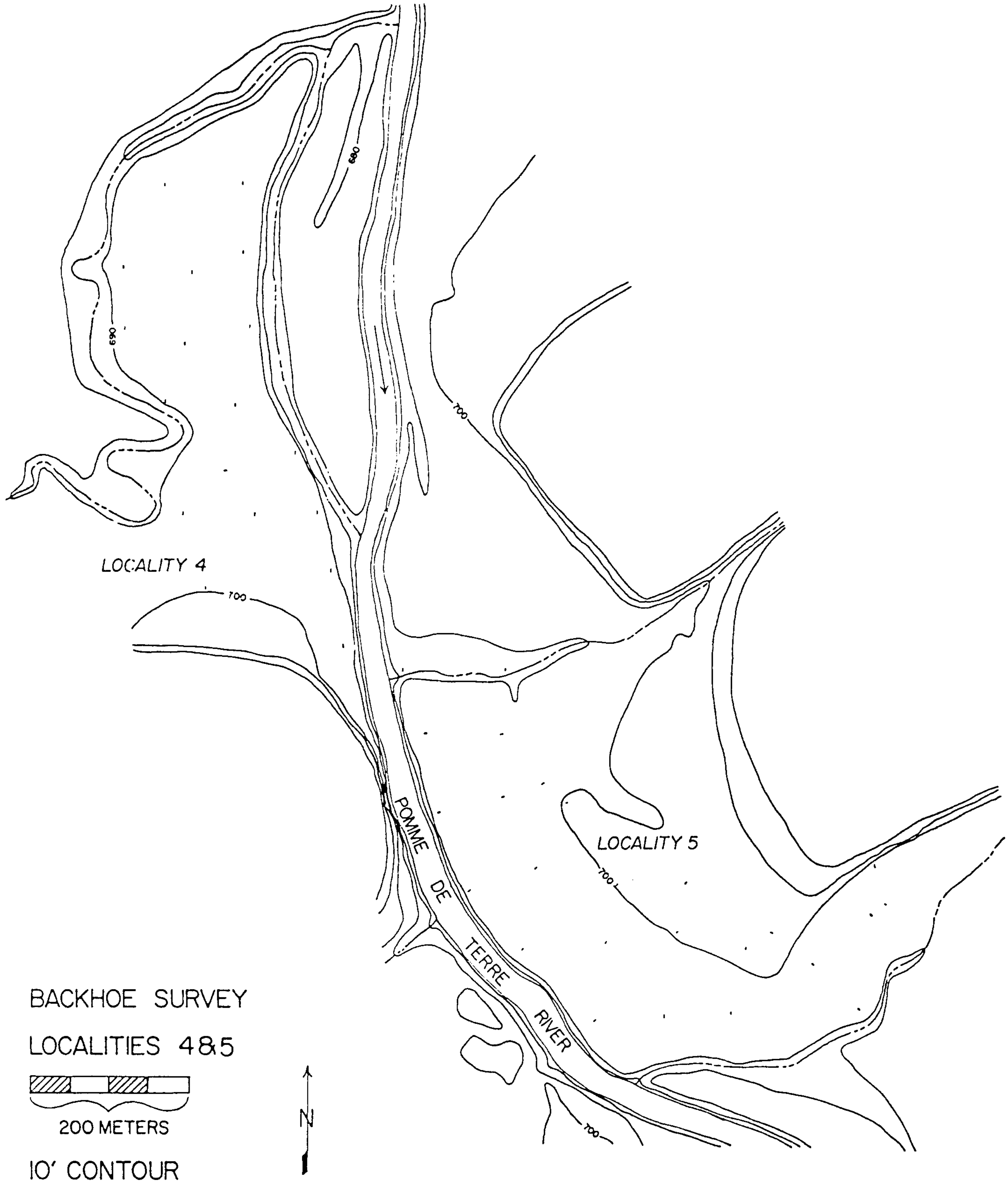


Figure 6. Locality 4 and 5

selected for Locality 5 had another attraction – certain parts of it had been mapped by Johnson (1977) as having been deposited early in the Rodgers alluviation and could potentially contain some of the oldest deposits in the reservoir area.

Hole placement proceeded north along the river, approximately 20 meters back from the bank, then back towards the bluff base. Holes were approximately 80 meters apart. Twenty-five holes were dug at this locality, covering all parts of the T-1b terrace. Two new sites (23BE764 and 23BE765) were discovered, and three previously recorded sites (23BE537, 23BE538 and 23BE539) were resurveyed, revealing buried components. The cultural material in 23BE764 and 23BE765 was diffuse, making it difficult to distinguish components. Also, the occurrence of natural chert pebbles made distinction between cultural and natural flakes difficult.

Site 23BE537 had a dense concentration of lithics from the surface through the plowzone. However, buried material was very diffuse and consisted only of flakes. Resurvey of 23BE538 yielded abundant cultural material to a depth of 3.42 meters. A Late Archaic style projectile point base was found at 1.45 meters below surface. The predominance of white Burlington chert as the raw material was pronounced at this site. This site is located in the area mapped as "older Rodgers." Site 23BE539 yielded diffuse lithic debitage to a depth of 3.42 meters below surface. This site also is located within the area mapped as "older Rodgers alluvium."

Little cultural material (three flakes) was found below 2.65 meters below surface at Locality 5. However, charcoal at greater depths (three to four meters below surface) was common. Five samples of it were taken.

The surface of the T-1b terrace at this locality has numerous rises and depressions, indicating past cutting activity by the river across the terrace. The locality is currently on an inside bend of the river.

The Rodgers Alluvium here has abundant natural chert gravel (patinated) in some holes, especially nearer the river. When gravel was present, it usually increased with depth. Also, back near the bluff pieces of dolomite limestone were found in the alluvium. Sand content generally increased with depth and with proximity to the river. In many cases, clay content increased with depth (clay translocation).

Locality 6

Locality 6 (Fig. 7) was selected as the locality for the plains stratum. It was the furthest northwest area which had enough T-1b terrace to backhoe survey. Most of the area had recently been cleared of trees, which at first appeared to be an advantage, in that the clearing would have made accessible an otherwise inaccessible area. However, ruts created by clearing machinery had dried hard forming an all but impassable ground surface. After three holes were dug at this locality, the backhoe operator's fear for the life of his machine necessitated abandoning this locality, hopefully only temporarily, as the clearers were scheduled to return to the area to finish their work at a later date, leaving the ground in better condition.

The first of the three holes was placed as close to the South Grand River as the backhoe could travel (150 meters), and the other two were placed 80 and 160 meters due north of the first. The first and third holes were devoid of cultural material. The three cultural items in hole number 2 were scattered from 1.57 to 2.32 meters below the surface (23HE632). They are thought to represent a single component, however, as the chert type appears identical and technology is very similar (large crude tools and flake of Burlington chert).

The alluvium, as identified by both Johnson and Haynes in the field, is Rodgers Alluvium, although highly reduced in this area, making it a greyish color. This extreme example of reduced Rodgers led to an original misidentification of the sediment as Boney Spring deposit. Flooding and massive scouring have been responsible for the poor drainage which caused the reducing conditions in the deposits. A, B and C soil horizons were fairly well defined in all three holes. The A horizon was dark brown with a blocky structure, the B a tannish grey with some orange mottling, and the C horizon a mottled grey clayey silt with large reddish orange iron deposits as well as large manganese deposits.

Locality 7

Locality 7 (Fig. 8) is located on the southeast bank of the South Grand River in Henry County on the inside of a bend in the river. It follows the river for approximately 1.2 kilometers in a strip ranging from 30 to 150 meters wide.

Immediately prior to the beginning of backhoe survey in this locality, the area had been cleared of trees in preparation for reservoir-filling. Large deep tree roots occurred occasionally in holes, but they presented no problems. Also, the area was not badly enough rutted to prevent access to any designated hole locations. Standing water

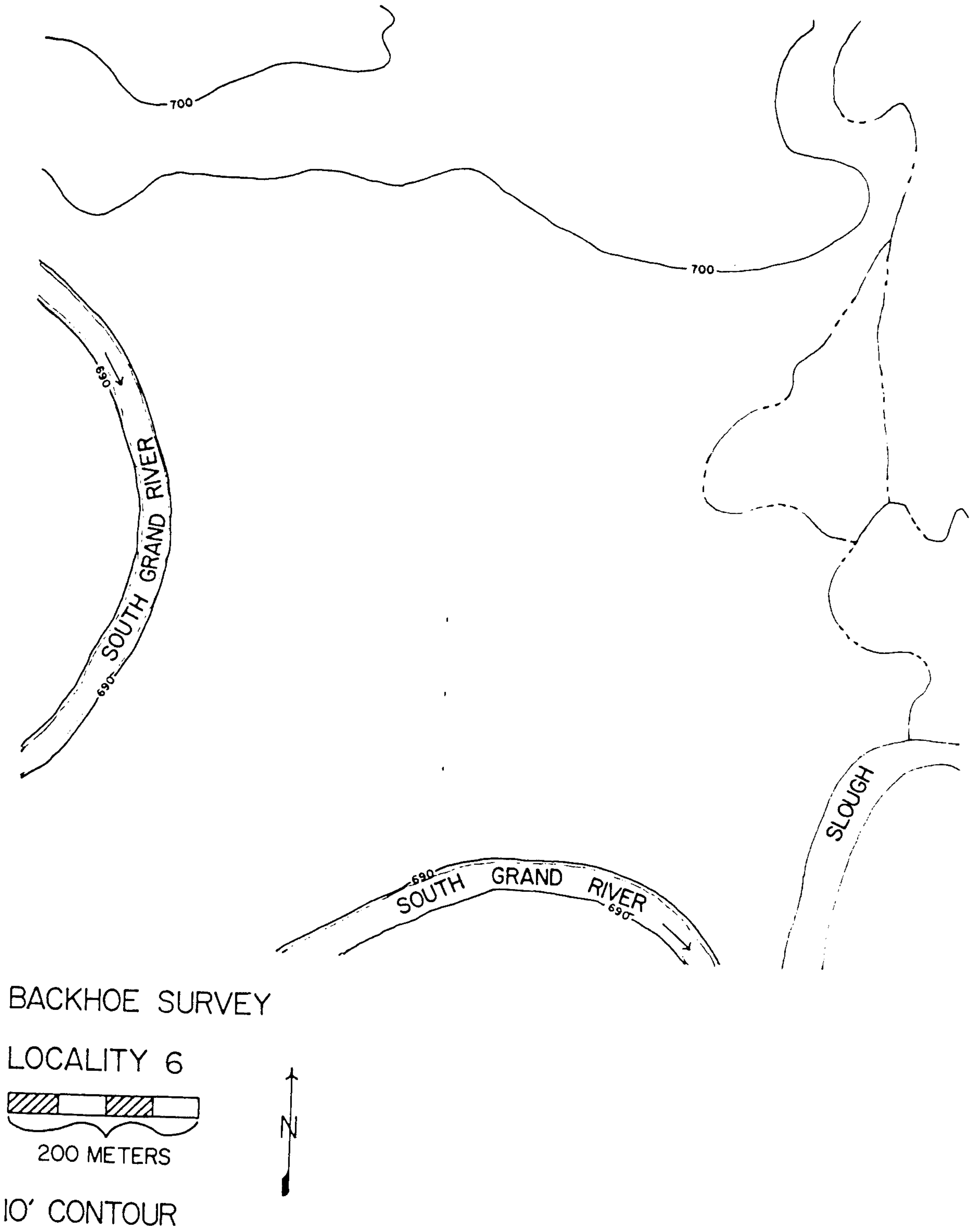


Figure 7. Locality 6

Figure 8. Locality 7

was present here and there, but again, did not prevent access to necessary locations.

This locality was selected after Locality 6 became inaccessible. It is the farthest northwest area in the reservoir area which was suitable for backhoe survey.

The area was initially probed with a hand probe and revealed a somewhat unhomogeneous Rodgers Terrace. The Soil Conservation Service has mapped the area as having Verdigris series soils (Grogger and Persinger 1976).

The strategy at this locality was to begin at the intermittent stream immediately south of hole number 1 and continue as far along the terrace (digging as many holes back from the river as the width of the terrace would allow – usually only one or two) as the time allotted for this locality would permit.

Of the nineteen holes dug at this locality, only holes 2, 5, and 18 contained cultural material. None of the holes are related; consequently, three site numbers 23HE633, 23HE634 and 23HE635, each with a single component were assigned to the three holes. No charcoal samples were taken at the locality, so dating the sites is not possible at this time.

The lack of cultural material might be explained by the extensive channel cutting and filling which has occurred across the bend in the river. Sediment color is fairly homogeneous throughout the locality, but texture varies from quite sandy to very silty.

Locality 7, then, provided little cultural information. The river activity in the area, as evidenced by profiles and the scattered terrace remnants, may be responsible for this.

ANALYSIS

Ordinal Analysis of Trends Through Time

Although most sites recorded in this backhoe survey cannot be identified to previously established time periods due to lack of time-diagnostic cultural material, the exposure of vertical profiles does lend itself to ordinal analysis of trends through time. In particular during backhoe operations, there was an indication that there might exist some differentiation in the type of chert predominating at various depths in the holes. Also, the type of chert source (river cobble, tabular, etc.) in each level appeared to vary with depth. And although there was no obvious trend observed in the field, it was hypothesized that there were differences in these two variables by depth between the environmental regions.

An important assumption implicit in this analysis is that depth = time at least relatively. This assumption must be made explicit, since post-depositional factors most certainly modify the sediments in which the archeological record is preserved and, therefore, influence our interpretation of cultural systems from that record.

Several sets of hypotheses and alternatives can be formulated and tested in order to answer these questions:

1. H_0 - The distribution of chert types is even over all depths.
   H_A - The distribution of chert types is not even over all depths.

2. H_0 - The distribution of chert procurement sources represented is even over all depths.
   H_A - The distribution of chert procurement sources represented is not even over all depths.

3. H_0 - The distribution of chert types with depth is even in the forest stratum.
   H_A - The distribution of chert types with depth is not even in the forest stratum.

4. H_0 - The distribution of chert types with depth is even in the transition stratum.
   H_A - The distribution of chert types with depth is not even in the transition stratum.

5. H_0 - The distribution of chert procurement sources represented with depth is even in the forest stratum.
   H_A - The distribution of chert procurement sources represented with depth is not even in the forest stratum.

6. H_0 - The distribution of chert procurement sources represented with depth is even in the transition stratum.
   H_A - The distribution of chert procurement sources represented with depth is not even in the transition stratum.

The first two sets deal with the reservoir as a whole, while the following four deal with the two strata of the reservoir as separate entities. The prairie stratum was not included in the study because of the limited amoung of data recovered.

The test selected to test these hypotheses is the Kruskal-Wallis one-way analysis of variance. The only assumption of this test is that the common probability distribution, whatever it is, is continuous. This test is appropriate

for ordinal-scale data since it involves a comparison of the sums of the rankings for each of the categories of the nominal-scale variable. The test statistic, H, which has approximately a chi-square distribution, measures the degree to which the various sums of ranks differ from what would be expected under the null hypothesis.

By hand, the mean rank for each group is found by dividing the sum of the ranks in that group by the number of units in that group. The grand mean is the total sum of ranks divided by the number of ranks. Using the same idea as in a regular one-way analysis of variance, the groups are compared by computing the sum of the squares of the deviations between the group means and the grand mean, as weighted by the size of the group. The test statistic, H, is found by multiplying this sum by a constant. The degrees of freedom used are k-1 (k=the number of categories used). The P-value for H can be found in a chi-square distribution table. Although this is a nonparametric test and requires fewer assumptions than the F-test (the corresponding parametric test), it is very powerful as long as the assumptions hold.

Fortunately, version 8 of SPSS (Nie et al. 1975) contains non-parametric statistics tests, including the Kruskal-Wallis test. It provides the chi-square value (H) and the level of significance of the statistic, both accounting for ties and not accounting for ties. (Although the assumption of a continuous distribution is made for this test, of course, in reality ties do exist. The correction increases the value of H and, therefore, lessens the P-value estimated by the chi-square distribution.)

In setting up this test for computer analysis, it was necessary to determine which variables were independent and which were dependent. In order to comply with the set-up of this particular test, we must treat depth as a dependent variable. Fifteen chert types and six procurement sources were used. Proveniences recorded originally as a range were collapsed to a group rank for entry into the computer data file. Two subfiles were included corresponding to the two strata sampled. The .05 level of significance was selected as the critical region.

Nine tests in all were computed; five on chert type and four on procurement source. Of the five chert tests, the first two were run on all fifteen categories of chert to see the effects of collapsing the ranked data. The same was done for procurement source. The chi-square values for both the type and source showed that the collapsing made very little difference in the value of chi-square. The values for type were both very high (significance was .000). The values for source were much lower (10.1 and 11.5) with

significance at the .008 and .009 levels. The rest of the tests were run on uncollapsed data in order to take full advantage of the ordinal level of measurement.

The large number of categories under chert type were causing very high values for chi-square, therefore, five of the categories (all the exotic chert types) were collapsed into one group. This reduced the value of chi-square greatly (from 70.6 to 30.1), but the significance level was still .000.

Next, the subfiles were run to test for variability between the strata. For chert type, a test was run with eleven categories, then one with just ten (the exotic chert eliminated altogether). For procurement source, five categories were run (the "other" category eliminated this time). The chi-squares are very high for the chert type tests; and too low to be significant at the .05 level for procurement source in both subfiles.

The results of the analysis show a significant relationship between chert type and depth in general, as well as between chert source and depth. There is also a significant relationship between the particular region and type by depth. However, no significant relationship was found between the particular region and source by depth. Having established these relationships, it would not be possible to perform analyses (such as a principal components analysis) designed to characterize each depth. This would determine which chert types and sources are contributing to the variability.

Post-depositional Factors

As has been briefly mentioned throughout this paper, post-depositional forces are of significance in the depositional environments with which we deal in the reservoir area. It is appropriate to discuss some of the possible processes operating and to determine the extent to which these processes altered the formation of the sites.

Wood and Johnson (1978) examine nine disturbance processes common in archeological sites. These include faunalturbation, floralturbation, cryoturbation, graviturbation, argilliturbation, aeroturbation, aquaturbation, crystalturbation and seismiturbation. Of these processes, cryoturbation, floralturbation and faunalturbation are potential site disturbance processes in the Truman Reservoir area. Cryoturbation, or frost heaving, has probably had some effect on the vertical positions of the lithic material. The extent of the effect of this activity, however, depends on how long the material remains within the zone of frost activity (the uppermost section). Also, differential movement occurs based on physical properties of the object,

particularly a factor called "effective height." In addition, artifacts buried near the surface will move up faster than those buried deeper. Artifacts oriented at differing angles tend to rotate toward the vertical with each freeze-thaw cycle. Although some sites were buried rapidly after deposition with a thick layer of sediment, no doubt other now buried sites were within the frost action zone for a considerable amount of time. It must be remembered that during part of the time period we are considering, the Hypsithermal climatic interval was at its height. This warming period may have decreased the amount of frost-heaving (although deposition decreased during that time also).

Floralturbation, primarily in the form of root growth and decay, has caused visible disturbance in some sites. It is recognized by root casts in the sediment and can, therefore, be controlled for. Tree fall is another form, and while certainly an active disturbance process (all areas backhoed were forested prehistorically), it was not often recognized during backhoe survey.

Evidence for faunalturbation was found in the presence of krotovinae. Rodents and other burrowing animals are responsible for these filled-in burrows. Also, earthworms have blurred contacts in the upper parts of many profiles. Again, the extent to which this process affected buried sites depends on how long the site was near the surface.

Another disturbance process highly likely to have affected formation of these sites is fluvial action. High velocity flooding could not only affect the orientation of artifacts, but also actually move them to another location and redeposit them.

In addition to these natural processes, two types of human disturbance were encountered. First, plowing has been common historically in all localities. Certain machinery has disturbed the sediment to a depth of one meter in some areas. Also, in one locality a hole was begun in what was found to be a recent trash fill area.

Orientations of flakes, which were recorded for most occurrences, give some clue as to the extent of the processes discussed. In no cases were all artifacts oriented horizontally, indicating that at least some disturbance has taken place. Nor in any recorded cases were the flakes overwhelmingly vertically oriented, indicating that frost heaving was probably not highly prevalent. In many cases, vertically diffuse flakes occurred with a living surface impossible to discern. Even when a dense layer of flakes occurred, as at 23BE474, flakes were oriented in all directions, and in very few cases in the entire study was there a change in the sediment to correspond with a heavy

concentration of cultural material. These sediments have undergone considerable turbation, probably fluvial for the most part, though perhaps frost heaving has had some effect.

Interpretations of the archeological record will have to be qualified according to these processes. However, it is felt that ordinal treatment of the data (as in the chert type analysis) on a large vertical scale (4.5 meters) is justified.

SUMMARY

Using what was known of other buried site research and what was known of the alluvial situation in the Truman Reservoir area, a methodology for backhoe research was developed, using a cultural model around which to design the research. In the model, questions pertaining to spatial distribution were asked, making it important to test many specific types of locations, since the reservoir contains a great variety of environmental situations, enhanced by its situation on an ecotone. The effort to adequately sample all of the necessary localities was hampered by the cumbersome preparation and follow-up tasks surrounding the backhoeing of each locality. An alternate sampling design was implemented which sacrificed control of variability within the three environmental zones of the reservoir area, thereby de-emphasizing the broad ecotone questions. Sampling only one locality thoroughly within each zone put more importance on the immediate localities of sites and their relationships to each other. The revised sampling design would certainly be more appropriate for most cases where locational information is desired. Generally, a variety of hydrological and topographical information is needed, and it is much more efficient to thoroughly study fewer areas.

Field technique became increasingly streamlined as the work progressed. An efficient system was developed for using the backhoe to its fullest capacity and coordinating crew activity.

Nineteen sites were added to inventory of sites in the reservoir area (and several previously recorded sites were resurveyed), and although most could not be specifically assigned to time periods, all are Archaic. One of the sites consisted of a discrete occupation layer sealed off from other cultural material, offering a cultural assemblage of a particular stage of the Archaic (23SR504). A second site was also tested (23SR675). The results of both these tests are to be found in Vol. I.

The lack of time-diagnostic artifacts was unanticipated, based on previous luck (which in retrospect was extraordinarily good) in finding diagnostics in the buried sites

previously discovered in the reservoir area. Until then, every buried site found had had either a projectile point or feature associated with it (eroding from a cutbank or exposed in a backhoe trench). The lack of diagnostics found in the present research made it impossible to carry out some of the analysis originally planned. However, careful vertical control while surveying made it possible to perform an ordinal analysis on the lithic material which does show change through time, even without the specific time periods known. Fluvial post-depositional processes have altered the positions of artifacts, perhaps to a large degree in some cases, and these must certainly be considered before drawing final conclusions.

CONCLUSIONS

The backhoe survey for buried sites had the dual goal of providing data for a fuller understanding of locational variability in the Archaic period and obtaining data in order to make cultural resource management recommendations for a poorly represented group of sites (i.e., those which are buried in alluvial contexts). The unfortunately poor return of diagnostic materials left hanging the research questions concerning locational variability, except for the notable fact that archeological sites were found in <u>every</u> locality in which testing was conducted. These localities were dispersed throughout the reservoir, including in all major environmental zones and most major stream drainages.

Testing by means of expansion of the plot trenches would have been the next step for examining these sites and was in fact conducted at two sites in 1978. Testing of deep sites is labor-intensive, however, and it becomes necessary to weigh available project resources and all needs. It was also the case that, by the 1979 field season, water levels had risen faster than projected and sites at which testing might have been conducted were no longer accessible.

Buried resources are likely to suffer less disturbance than are surface resources, particularly in situations such as those in Truman Reservoir where the matrix is clayey. It is, therefore, likely that the sites recorded during the 1978 backhoe survey will be available for answering relevant research questions. It is recommended, however, that monitoring be conducted, particularly during periods of drawdown and in upstream areas where the shoreline cross-cuts the Rodgers terrace. Wave action in these areas could potentially cause erosion of the terrace and loss of these known resources.

APPENDIX A

AREAS SURVEYED FOR RODGERS ALLUVIUM

Given the known terrace sequence and understanding of the archeological record of the Truman Reservoir, the Holocene-age Rodgers Terrace, or Rodgers Alluvium, is the most feasible landform in which to explore for buried sites. Accordingly, a number of alluvial areas were examined to determine the overall age of their deposits and the feasibility of exploring for buried sites using the backhoe. Areas where backhoe survey was performed are described in the text of this report. Additional exposures of Rodgers Alluvium have been mapped, however, but for one reason or another were not systematically explored for buried sites. These additional exposures are described here. This is not intended to comprise a complete description of the extent of the Rodgers Terrace; it is merely intended as documentation of places where Rodgers Alluvium is known to be present.

Areas Surveyed for Rodgers Alluvium

1. T38N, R25W,	section 11 -	NE 1/4	SE 1/4	NW 1/4
		SE	SE	NW
		SE	SW	NE
		SW	SW	NE
		SE	SE	NE
		SW	SE	NE
		NE	NW	SE
		NW	NE	SE
		NE	NE	SE
	section 12 -	SE 1/4	SW 1/4	NW 1/4
		SW	SW	NW

Upper Middle Osage Stratum
St. Clair County
Osceola Quadrangle
Osceola Township
Corps map #41
Tract #'s 5317, 5318, 5319
Elevation 700-705'

In the western part of this area, Rodgers Alluvium was found running parallel to the Osage River, from the river back approximately 100 meters, and extending .6 meter deep. Immediately below it is a quite sharp contact with a mottled grey clayey layer, assumed to be a T-1a terrace (Boney Formation). Since the area had been probed only to a depth of approximately .5 meter, the Rodgers had been

taken as an indication of a T-lb terrace. A single backhoe hole was dug here (to 2.0 meters below the ground surface), whereupon the soil situation was interpreted as overbank deposition of Rodgers Alluvium (cut and fill) on the older T-la terrace.

Further east in this area, between the intermittent stream and the river in section 12 and immediately the other side of the intermittent stream, is Rodgers Alluvium which extends at least 1.2 meters in depth. However, the backhoe was unable to reach this part due to extremely muddy conditions. Therefore, it was not possible to determine whether or not this part of the area was a true T-lb terrace or simply part of the T-la terrace with a deep deposit of Rodgers Alluvium covering it.

This area should be resurveyed if backhoeing is considered. In the light of increased knowledge of the variety of properties Rodgers Alluvium can exhibit, the "T-la" sediments should be re-examined. Rodgers Alluvium which is poorly drained can be deceptively different in its grey color and blocky structure from "typical" Rodgers. Though this area is relatively well-drained at the present, different geomorphological conditions could, of course, have prevailed in the past.

2. T39N, R24W, section 31 -	SE 1/4	SE 1/4	NE 1/4
	SW	SE	NE
	SE	SW	NE
	SW	SW	NE

Upper Middle Osage Stratum
St. Clair County
Iconium Quadrangle
Butler Township
Corps map #41
Tract #5210
Elevation 690-700'

This area is located southeast of Locality 1, on the opposite side of the Osage River, on the inside of a bend in the river (Horseshoe Bend). The opportunity for observation of the soil in this area at considerable depth came about as a result of the testing of explosives by the U.S. Army Corps of Engineers.

Three deep craters aided the examination of the area between the intermittent stream and the river to the north (a 200 meter wide strip) for a distance of .8 kilometer. Rodgers Alluvium was found to extend the width of that area and most of the length of it. In the extreme western part, the terrain declined slightly (less than a meter) and a darker alluvium (Pippins) was encountered.

3. T40N, R23W, section 33 - SE 1/4 SE 1/4 NE 1/4
SW SE NE
NE NE SE

section 34 - SE 1/4 SW 1/4 NW 1/4
SW SW NW
NE NW SW
NW NW SW

Lower Middle Osage Stratum
Benton County
Warsaw West Quadrangle
Tom Township
Corps map #25
Tract #'s 1715, 1716
Elevation 690-700'

This area has extensive Rodgers Alluvium of typical reddish brown color. It extends 350 meters back from the Osage River, where there is a slight dip; the parent material is darker, younger Pippens Alluvium.

4. T39N, R22W, section 12 - NE 1/4 SW 1/4 NE 1/4
NW SW NE
SE SE NW
SW SE NW

Lower Pomme Stratum
Benton County
Warsaw West Quadrangle
Alexander Township
Corps map #34
Tract #'s 915, 917
Elevation 680-690'

This area is part of a very large floodplain of the Pomme de Terre River, the rest of which was inaccessible at the time this area was surveyed due to muddy conditions. The area surveyed, however, was typical Rodgers Alluvium.

5. T41N, R23W, section 24 - SW 1/4 SW 1/4 NE 1/4
NW SW NE
NE SW NE

Little Tebo Stratum
Benton County
Shawnee Bend Quadrangle
Lindsey Township
Corps map #13
Tract #2325-2
Elevation 690-700'

In this area the Rodgers terrace is present from Little Tebo Creek back 100-150 meters. The alluvium was the typical reddish brown clayey silt, with a well developed B horizon.

6. T41N, R22W, section 18 - SE 1/4 SE 1/4 NE 1/4
NE SE NE

section 13 - SW 1/4 NW 1/4 NW 1/4
SE NW NW
NW SW NW
SW SW NW

Little Tebo Stratum
Benton County
Shawnee Bend Quadrangle
Lindsey Township
Corps map #13
Tract #'s 2308, 2309
Elevation 700-710'

This area is a T-1b terrace; however, areas of dark brown Pippins Alluvium are present next to the intermittent stream which runs perpendicular to Little Tebo Creek. (More specific sediments information is available in the report of 23BE681).

7. T41N, R23W, section 18 - SE 1/4 NW 1/4 NE 1/4

Lower Tebo Stratum
Benton County
Leesville Quadrangle
Lindsey Township
Corps map #12
Tract #2416
Elevation 680-690'

This area is in an abandoned meander loop of Tebo Creek near a permanent stream, Clear Creek. In this particular place Clear Creek lies between Tebo Creek and the area described (Clear Creek cuts through the meander). Rodgers Alluvium was present in this area next to Clear Creek. The area was not surveyed with the backhoe due to logistics.

8. T41N, R25W, section 30 - SE 1/4 SE 1/4 SW 1/4
NE SE SW
SE SW SE
NE SW SE
SW SW SE
NW SW SE

section 31 - NE 1/4 NE 1/4 NW 1/4
NW NW NE
NE NW NE

Confluence Stratum
Henry County
Gaines Quadrangle
Clinton Township
Corps map #11
Tract #'s 12650, 12662
Elevation 690-700'

Rodgers Alluvium was present here from slightly below the 700' line to within 50 meters of the river where Pippins occurs. This area also appears to be an old cut-off meander, with a remnant of older soil situated in the middle of the bend. It was in this area that it became clear that the Verdigris soil name used in the Henry County Soil Survey (Grogger and Persinger 1976) refers to what has been called Rodgers and Pippins alluvia in other parts of the reservoir area.

Inaccessibility to this area with the backhoe due to tree clearing prevented surveying in this area.

APPENDIX B

Site Number Designations

Locality 1:

23SR504 (resurvey) - Holes 56 and 58
23SR469 (resurvey) - Holes 41 and 42
23SR469 (resurvey) - Holes 39 and 40
23SR465 (resurvey) - Holes 19, 30, 32, 33, 34, 35
23SR686 (JEJ53178-2) - Holes 13, 14, 15
23SR468 (resurvey) - Hole 4
23SR690 (JEJ53178-8) - Holes 24, 26, 27, 28
23SR691 (JEJ53178-9) - Holes 44 and 45
23SR692 (JEJ53178-10) - Hole 57
23SR675 - Holes 20, 21, 22, 31

Locality 2:

23HE629 (JEJ6578-1) - Holes 2 and 8
23HE630 (JEJ6578-2) - Holes 1, 6, 7
23HE631 (JEJ6578-3) - Holes 4 and 5

Locality 3:

23BE759 (JEJ6978-1) - Hole 1
23BE760 (JEJ6978-2) - Hole 3

Locality 4:

23BE761 (JEJ71478-1) - Holes 5 and 6
23BE762 (JEJ71478-2) - Holes 9 and 14
23BE763 (JEJ71478-3) - Holes 10, 11, 12, 13, 15, 17, 18
23BE474 (resurvey) - Holes 1, 2, 8

Locality 5:

23BE764 (JEJ72078-1) - Hole 1
23BE765 (JEJ72078-2) - Holes 15, 17, 18, 19
23BE537 (resurvey) - Holes 6, 7, 8, 9, 10, 23, 25
23BE539 (resurvey) - Holes 12 and 24

Locality 6:

23HE632 (JEJ73178-1) - Hole 2

Locality 7:

23HE633 (JEJ8978-1) - Hole 2
23HE634 (JEJ8978-2) - Hole 5
23HE635 (JEJ8978-3) - Hole 18

REFERENCES CITED

Ahler, Stanley A.
1978 Post-Pleistocene depositional change at Rodgers Shelter, Missouri. _Plains Anthropologist_ 18(59): 1-26.

Benedict, James B. and Byron L. Olson
1978 The Mount Albion complex. _Center for Mountain Archeology Research Reports_ 1.

Broyles, Bettye J.
1966 Preliminary report: the St. Albans site (46Ka27) Kanawha County, West Virginia. _The West Virginia Archaeologist_ 19: 1-56

Butzer, Karl W.
1977 Geomorphology of the lower Illinois Valley as a spatial-temporal context for the Koster Archaic site. _Illinois State Museum Reports of Investigations_ 34.

Chapman, Jefferson
1977 Archaic period research in the lower Little Tennessee River valley. _University of Tennessee, Department of Anthropology, Report of Investigations_ 18.

1978 The Bacon Farm site. _University of Tennessee, Department of Anthropology, Report of Investigations_ 23.

Coe, Joffre L.
1964 The Formative cultures of the Carolina Piedmont. _Transactions of the American Philosophical Society_ (n.s.) 54(5).

Grogger, Harold E. and Ival D. Persinger
1976 Soil survey of Henry County, Missouri. U.S.D.A. Soil Conservation Service, in cooperation with the Missouri Agricultural Experiment Station.

Haynes, C. Vance
1968 Geochronology of late-Quaternary alluvium. In _Means of correlation of Quaternary successions_, edited by R. B. Morrison and H. E. Wright, pp. 591-631. University of Utah Press, Salt Lake City.

1976 Late Quaternary geology of the lower Pomme de Terre valley. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 47-61. Academic Press, New York.

Johnson, Donald L.
1977 Soils and soil-geomorphic investigations in the lower Pomme de Terre valley. In Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. X: environmental study papers, pp. 59-139. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archeology Division, University of Missouri, Columbia.

Joyer, Janet E.
1977 The distribution of Middle Archaic components in the Truman Reservoir area. In Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. IX: preliminary studies of Early and Middle Archaic components, pp. 59-80. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Joyer, Janet E. and Donna C. Roper
1980 Archaic adaptations in the central Osage River basin: a preliminary assessment. In Archaic prehistory on the Prairie-Plains border, edited by Alfred E. Johnson, pp. 13-23. University of Kansas, Publications in Anthropology 12.

King, Frances B.
1978 Vegetational reconstruction and plant resource prediction. In Holocene adaptation within the lower Pomme de Terre valley, Missouri, edited by Marvin Kay, Chapter 2. Report to the U.S. Army Corps of Engineers, Kansas City District. Illinois State Museum Society.

Knox, J. C.
1976 Concept of the graded stream. In Theories of landform development, edited by W. N. Melborn and R. C. Flemal, pp. 169-198. State University of New York, Publications in Geomorphology.

Knox, J. C. and W. C. Johnson
1974 Late Quaternary valley alluviation in the Driftless area of southwestern Wisconsin. In Late Quaternary environments of Wisconsin, edited by J. C. Knox and D. M. Mickelson, pp. 134-162. American Quaternary Association Guidebook for the Third Biennial Meeting, Madison, Wisconsin.

McMillan, R. Bruce
1976a The Pomme de Terre study locality: its setting. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 13-41. Academic Press, New York.

1976b The dynamics of cultural and environmental change at Rodgers Shelter, Missouri. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 211-232. Academic Press, New York.

Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner, and Dale H. Bent
1975 Statistical package for the social sciences. McGraw-Hill, New York.

Odum, E. P.
1955 Fundamentals of ecology. W. B. Saunders Co., Philadelphia, Pennsylvania.

Piontkowski, Michael R.
1977 Preliminary archeological investigations at two Early Archaic sites: the Wolf Creek and Hand sites. In Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. IX: preliminary studies of Early and Middle Archaic components, pp. 1-57. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri, Columbia.

Plog, Fred and James N. Hill
1971 Explaining variability in the distribution of sites. In The distribution of prehistoric population aggregates, edited by George J. Gumerman, pp. 7-36. Prescott College, Anthropological Reports 1.

Saunders, Jeffrey J.
1977 Late Pleistocene vertebrates of the western Ozark Highlands, Missouri. Illinois State Museum Reports of Investigations 33.

Wood, W. Raymond and Donald L. Johnson
1978 A survey of disturbance processes in archaeological site formation. In Advances in archaeological method and theory, Vol. 1, edited by Michael B. Schiffer, pp. 315-381. Academic Press, New York.

PART II.

FIELD SURVEYS, 1978-1979

NUMBER 3

THE NATIONAL RESERVOIR INUNDATION STUDIES PROJECT EXPERIMENT

by

Donna C. Roper

ABSTRACT

A 10 x 102 m transect at 23SR189 was inventoried, but not collected, for studying the effects of inundation on surface distributions. The data are presented and shown to be minimally biased in that smaller pieces of debris were less likely to be observed in heavy ground cover. It is expected that inundation will destroy surface relationships and that destruction will occur differentially for the various debris classes.

[Note: Roper was contacted by Sandra L. Rayl of the National Reservoir Inundation Studies Project in July 1977 about the possibility of participating in that project's experimental program. Rayl and a representative from the Kansas City District of the Corps of Engineers visited the Truman project in the field in August 1977. The decision to set the experiment described here was made after viewing a number of sites and after a lengthy discussion of the goals of the Inundation Studies Project and the potential of the Truman Reservoir project to help in those experiments. Modification P00001 to the present contract subsequently specified that the contractor coordinate with the Inundation Studies Project. This report then was written both to inform the Corps of Engineers of the results of that coordination and to present the details of the experiment and the needed raw data to the Inundation Studies Project.]

INTRODUCTION

Archeologists have long assumed some sort of relationship between surface and subsurface distributions. In the last decade, the kind and strength of this association has been examined. The seminal works of Redman and Watson (1970) and Binford, et al. (1970) explored and confirmed the hypothesis of a general surface-subsurface isomorphism of debris distributions. These two studies, coupled with increasing interest in examination of activity sets, activity areas, and the like, led to a rapid growth of the use of what Redman and Watson called "Systematic, Intensive Surface Collections" (1970) for selecting areas of a site to be examined. Indeed several reports within the state of Missouri alone have inferred activity differentiation within sites entirely from surface evidence (Healan 1972, Kay 1972, Downer 1977). Use of intensive surface collections has since become prominent either as an end in itself or as an aid in placing excavation units.

Given the prominence of systematic intensive surface collections in archeology and the reliance on the use of surface scatter as an indicator of within site variability, it is an important assumption that surface distributions have not been drastically altered by post-depositional processes. In fact, the warranting information for this assumption has only recently been becoming available. Quantitative studies of the effects of plowing (Roper 1976, Trubowitz 1977) and scarification (Gallagher 1978) on surface distributions have recently appeared. The effects of inundation, although suspected to be possibly severe (Lenihan, et al. 1977: 74), are not yet quantified.

Accordingly, it was agreed that an experiment would be set in Truman Reservoir to be used to monitor the effects of inundation on surface distributions. This would be accomplished by inventorying the materials from the surface of a site or portion of a site, but leaving the debris in place so that later investigators could compare pre- and post-inundation scatters. This report describes in detail the site, its appearance at the time of the inventory in July 1978, inventory technique, a compilation of the data, and an assessment of its pre-inundation bias.

THE EXPERIMENT IN TRUMAN RESERVOIR

The site chosen for study in Truman Reservoir is an unnamed site designated 23SR189, on the north bank of the Osage River in St. Clair County (Fig. 1). This site had several characteristics to recommend it for this purpose. First, it is a large site with a relatively high debris density. Second, a portion of it was plowed, disked, and rained on, but not planted. Thus, observation conditions were ideal on portions of the site; and it is unlikely that this surface will ever be further altered prior to inundation. Third, the several meters of relief provide vertical control from the shoreline of the reservoir to a depth of several meters, but over a gentle slope. Fourth, the site is not near a major road - access is only by driving and/or walking several miles on field roads. It is therefore unlikely that the site will be tampered with prior to inundation.

23SR189 covers a total area of 72 hectares. Total vertical relief on the site is approximately 3 meters (Fig. 2), spreading across probably 3 terraces of the Osage River. Investigations at the site, in addition to those for purposes of the National Reservoir Inundation Study have included surface collections and a brief period of subsurface testing in July 1978 (Hanson, this volume).

The site extends from 690' to 710' MSL and will eventually be partially inundated. The 706' MSL contour line (the elevation of the permanent pool of the reservoir) crosses the site. The area below this elevation will, therefore, be in the active zone of the reservoir and will be subject to wave action, periodic fluctuations in water level, and other natural and culturally-induced mechanical processes (Garrison 1975).

The large size of 23SR189 precluded the ability to surface inventory the entire site. Accordingly, it was decided to inventory a transect perpendicular to the vertical relief of the site, but extending no higher than the approximate limits of the reservoir shoreline. It probably would have been desirable to extend the transect above the shoreline to compare effects on the inundated and non-inundated parts of the site, but this was not feasible since at the time of the inventory in July 1978 the field above 706' MSL was being planted. Any attempt at inventory and comparison would have been confused by continued agricultural activity.

The transect finally inventoried is 10 x 102 meters (Fig. 2), with the length perpendicular to the vertical relief of the site. The difference in elevation from one end to the

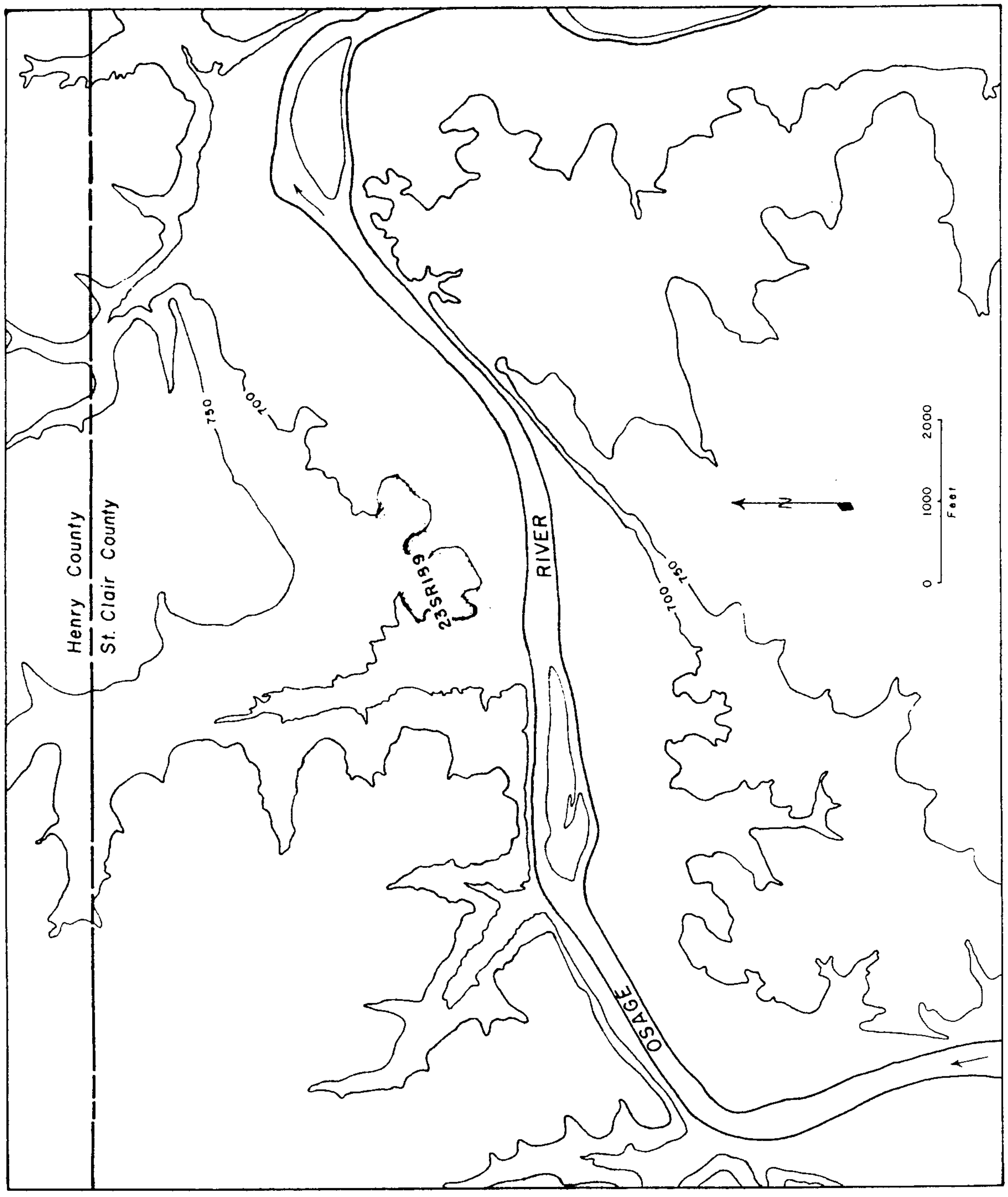


Figure 1. Site area map - 23SR189.

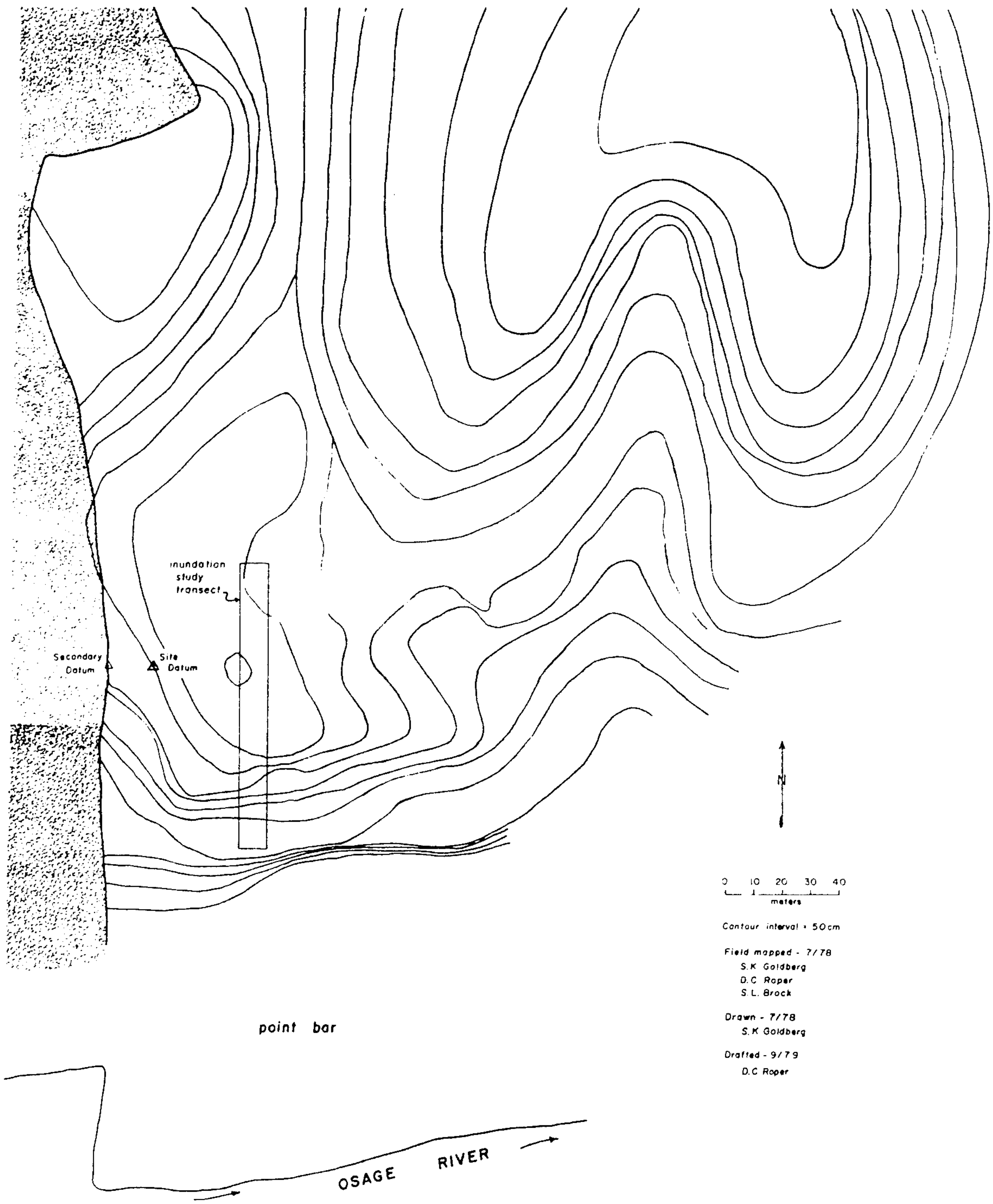


Figure 2. Topographic map of 23SR189, showing position of inundation study transect, and site data.

other is 2.5 m (Fig. 2). A cross-section shows two level areas separated by a gentle terrace scarp-face (Fig. 3). Ground cover conditions varied from a plowed, disked, well rained-on, not planted field at the upper level area, through relatively heavy weeds (often 75-100% ground cover) on the scarp-face, to an area with sparse vegetation (10-25% ground cover) and light bulldozing on the lower level area (Fig. 3).

The transect was divided into 255 2 x 2 meter squares (Fig. 4). Each square was examined by a crew member crawling on her/his hands and knees and counting the amount of debris on the surface of the square. Surface debris was recorded in 5 classes: bifacial artifacts, debris smaller than 1/2" in maximum dimension, debris 1/2" to 2", debris larger than 2", and rough rock (non-chert). The several pieces of historic material (bolts, nails) were also noted. The number of pieces of debris in each class was recorded on a card for each square. Also recorded were the square number, the examiner's initials, the date (7/25/78), percent ground cover in the square (0-25, 25-50, 50-75, 75-100), and whether or not there was any evidence of bulldozing in the square. Potentially diagnostic artifacts (esp. projectile points) were sketched on the back of the card. Surveyors were instructed to make 5 passes across the surface of each square. Vegetation was moved aside to allow examination of the surface. It was permissible to pick up a piece to examine or sketch it, but it was then to be replaced as encountered.

Photographs were made of the squares in the plowed portion of the transect only (debris would not have been visible in photographs of the other squares). Experiments were made with 35 mm B/W, 120 mm B/W, and 35 mm B/W infrared film. The 120 mm format did not properly incorporate all parts of the collection unit. Neither enough time nor enough film was available to experiment widely with B/W infrared. What infrared photographs were made, however, were total failures. Ultimately, all photographs were made with 35 mm B/W Plus-X film (ASA 125). All photographs are marked for square number and direction. Only squares 33 and 200 in the plowed portion were not photographed, both as a result of miscounting during fieldwork.

Two datum-points were emplaced. Both are 1" galvanized pipe, set in concrete. The concrete is marked with the site number and the date set (August 1978). The locations of the two points are shown in Fig. 2. Unfortunately, it was not possible to set either point above the water level as suggested in the NPS data collection guidelines (Lenihan, et al. 1977: 129-130). Any point high enough was either in the middle of a field that was still being cultivated, or was across the river and out of range of an ordinary optical transit.

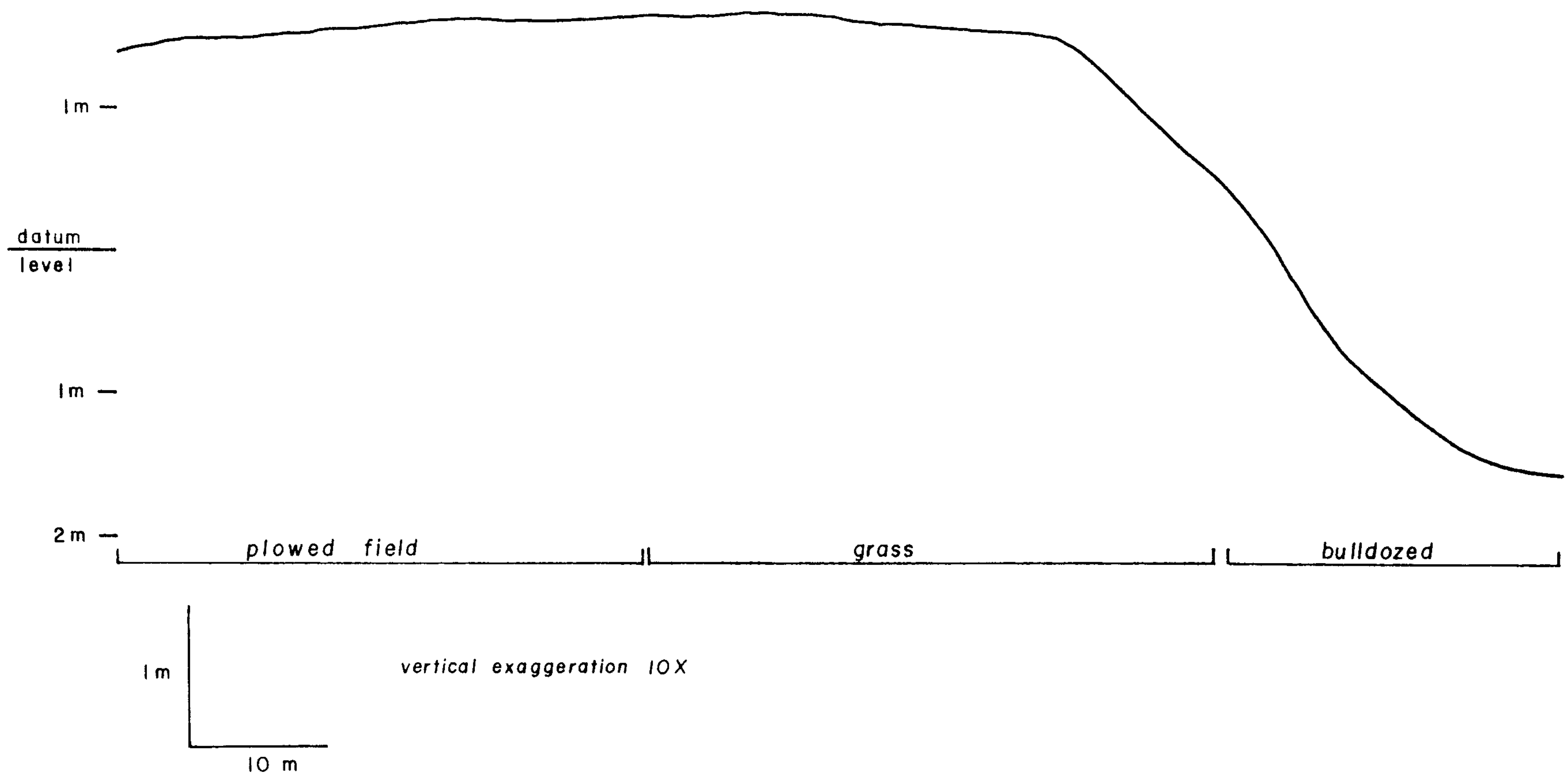


Figure 3. Cross-section of inundation study transect.

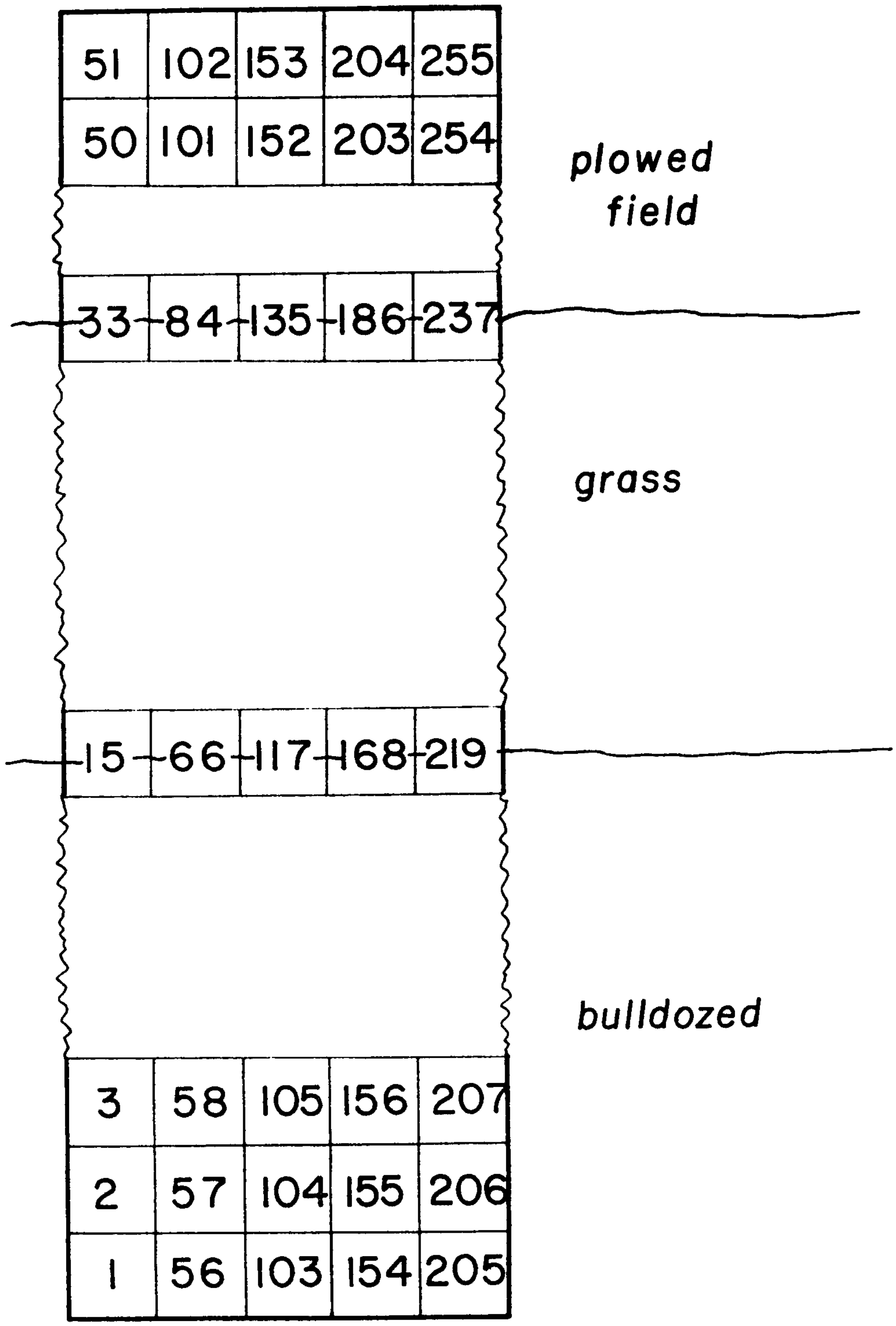


Figure 4. The transect.

The four wooden stakes marking the corners of the transect were also left in place. Division of the transect into 2 meter squares during collecting was done by fastening ropes marked in 2 m increments between rows of stakes at either end of the transect. No intermediate markers were ever placed in the ground, and, accordingly, are not available for reinspection.

DATA COMPILATION

Figure 5 plots the frequency and distribution of each of the five classes of debris within the transect. Summary analysis of frequencies of each category provides an indication of the amount of debris actually present in the transect (Figure 6). The raw data and tabulated summaries for Figures 5 and 6 are given in full in Tables C-1 and C-2 in the tables volume.

Density of all debris classes is not heavy in absolute terms. Although frequencies sometimes show wide ranges, modal values of all variables are low (Figure 6). This is particularly true of the classes of larger items (tools, debitage larger than 2").

GAUGING INUNDATION EFFECTS AND SEPARATING THEM FROM EFFECTS OF OTHER PROCESSES

Future evaluations of the effects of inundation on surface distributions will be made by comparison with the data presented in this report and thus are highly dependent upon the quality of the data from these initial observations. It would be unwise to assert that these data are unbiased; however, their use is possible if the bias is known ahead of time.

Three variables were monitored for their effects on the frequencies presented: presence-absence of extent of bulldozing, percent of ground cover, and identity of examiner of the square. It is assumed that the extent of bulldozing will not change between the 25 July 1978 surface inventory and any monitoring of the site at a future date. Further, although bulldozing may well have altered the relationship between surface and subsurface distributions, it will not be detrimental to this experiment, the aim of which is to evaluate how inundation affects the surface distribution present prior to inundation. For that matter, surface distribution could have been artificial. The bulldozing would, however, be a factor if the 23SR189 transect were ever to be used to test surface-subsurface relationships.

The amount of ground cover will, however, be subject to change. Different ground cover conditions prevailed in different parts of the transect at the time of inventory and

1	1		1	
1				
	1		1	
1				
		1		
	1			
1				
	2	1	1	1
3				
	2			1
		1		
1				
				1
			1	
3				
				1
				1
1	1			
1				
				1
	1	1	1	1
		1	1	
				1
	1			
			1	
		1		
			1	
			1	1
1				1
		1		1

Artifacts

14	23	18	14	19
16	6	10	13	24
22	15	26	25	5
20	31	23	48	27
7	11	4	11	37
4	18	8	21	74
30	30	37	36	38
40	26	30	35	9
43	16	37	25	33
28	39	21	42	27
33	43	36	43	25
39	66	13	15	57
22	18	32	16	28
47	23	30	36	27
22	12	24	57	41
13	15	38	44	9
14	47	31	14	58
25	20	38	24	29
23	36	34	13	51
5	4	2	5	6
2	2	6	5	3
2	6	6	6	9
7	3	1	15	7
9	2	3	9	11
31	10	3	9	6
16	16	11	16	7
4	14	7	5	15
6	14	4	15	17
4	3	9	18	2
23	10	14	15	14
16	20	15	4	2
11	16	13	13	41
6	5	4	6	34
8	1	1	15	11
8	16	11	11	16
	8	10	7	9
24	10	7	32	65
26	12	32	17	70
16	25	23	20	20
24	51	35	18	16
9	18	20	8	2
13	26	20	7	11
3	1	28	12	14
6	4	44	30	10
3	4	4	32	37
9	3	3	6	16
2	2	1	1	6
4	2	1	2	8
3	2	1		
3	1	1		
		2		1

Debris under 1/2"

20	21	9	16	11
8	8	13	17	11
12	18	11	13	3
9	18	19	24	19
1	6	33	39	28
10	23	7	11	6
25	15	14	30	9
16	19	18	35	18
17	33	32	5	14
23	25	14	33	16
33	14	18	30	22
25	12	41	51	26
3	22	27	13	14
9	22	30	14	16
31	15	19	20	22
24	7	25	34	38
10	16	4	29	12
22	21	21	17	4
24	18	7	13	38
7	2		3	4
	4	2	11	10
	14	2	5	9
6	3	3	9	6
8	1	1	6	6
7	18	3	4	9
2	6	10	18	16
10	8	20	3	9
8	1		3	13
10	3	2	24	8
17	9	13	6	10
8	11	11	5	3
12	11	10	14	14
3	4	13	3	18
1	7	11	11	22
14	7	9	21	11
2	8	7	6	26
4	7	13	26	12
16	14	9	14	18
8	7	19	18	30
13	26	9	23	12
1	10	16	15	19
4	15	20	7	10
3	9	8	6	27
3	3	27	27	15
3	2	11	14	12
3	4	3	4	4
1				8
1	2	1	3	4
1	3			1
	2			
1		3		1

Debris 1/2- 2"

2	1		2	
2	6		1	1
	2		3	
2		2	1	
		1		9
3	1			
1		1		
	1	1	1	2
	2	2	2	
1		3		1
1			1	
5		1	1	
	17			6
	1	1		
6		1	1	1
1	1			1
3	3		1	2
4	4	1		
1		1		6
1			1	
1		1		1
	1		1	1
2				1
1	2			1
	2			1
1				
2	3	1	1	1
2		2	3	3
	1	1	5	1
3	3		2	1
2	1	2	1	1
	4		5	3
1		1		3
		3		
	3		1	1
	3		1	2
1	3	1	1	2
2	4	1	34	3
3	1	1	1	7
2	1	1	2	2
	1	1	5	2
1	2		2	2
1	1	1	2	2
1		4	10	5
3	2		1	
1	1	2		2
1	1	1		1
1	1			

Debris over 2"

8	13	9	12	8
15	6	7	8	11
4	28	10	18	3
2	30	10	8	22
1	2	9	13	11
5	13	7	9	12
10	6	8	5	8
4	14	9	24	12
6	4	6	20	7
11	7	3	4	2
10	5	10	3	6
5	3	2	3	3
3	12	18		4
3	5	10	1	6
2		10	3	5
4	2	4	16	3
7	6	4	4	3
6	2	6	7	5
1	3	13	2	5
3	1	1	2	2
1	3	4	8	1
3	11		5	7
3	6	2	8	7
15	2	3	5	3
14	15	6	2	3
24	7	12	13	5
12	2	12	3	1
5	7	6	3	6
9	2	6	2	3
16	13	9	13	10
15	13	15	8	5
10	22	17	25	9
5	5	13	3	20
3	4	11	18	6
14	17	6	13	1
3	18	5	8	3
3	5	9	26	15
11	13	17	4	21
6	9	38	11	6
9	34	19	32	6
5	13	16	8	8
13	15	28	12	31
18	2	17	26	49
10	4	32	38	13
8	9	12	18	15
5	1	4	10	10
1	3	3	2	11
2	2	2	2	2
	2	1	2	1
	5	1	1	
10	8		1	2

Rough Rock

Figure 5. Frequencies and distributions of debris classes.

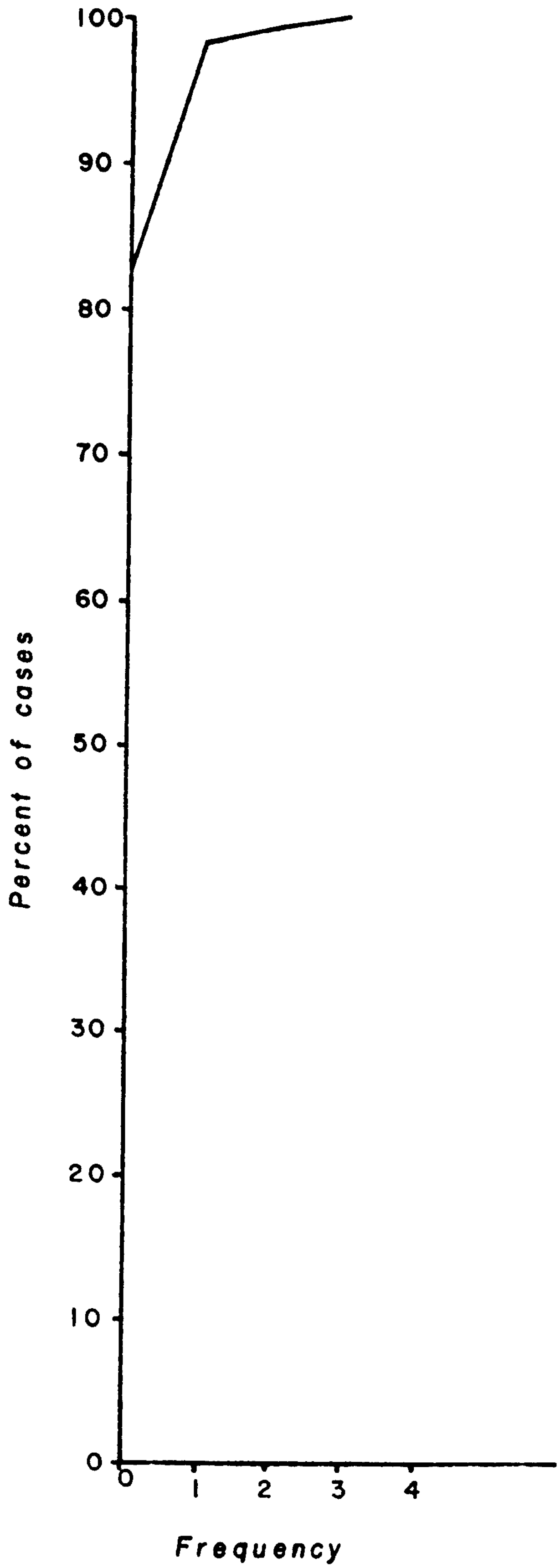


Figure 6a. Cumulative frequency distributions of debris classes — tools.

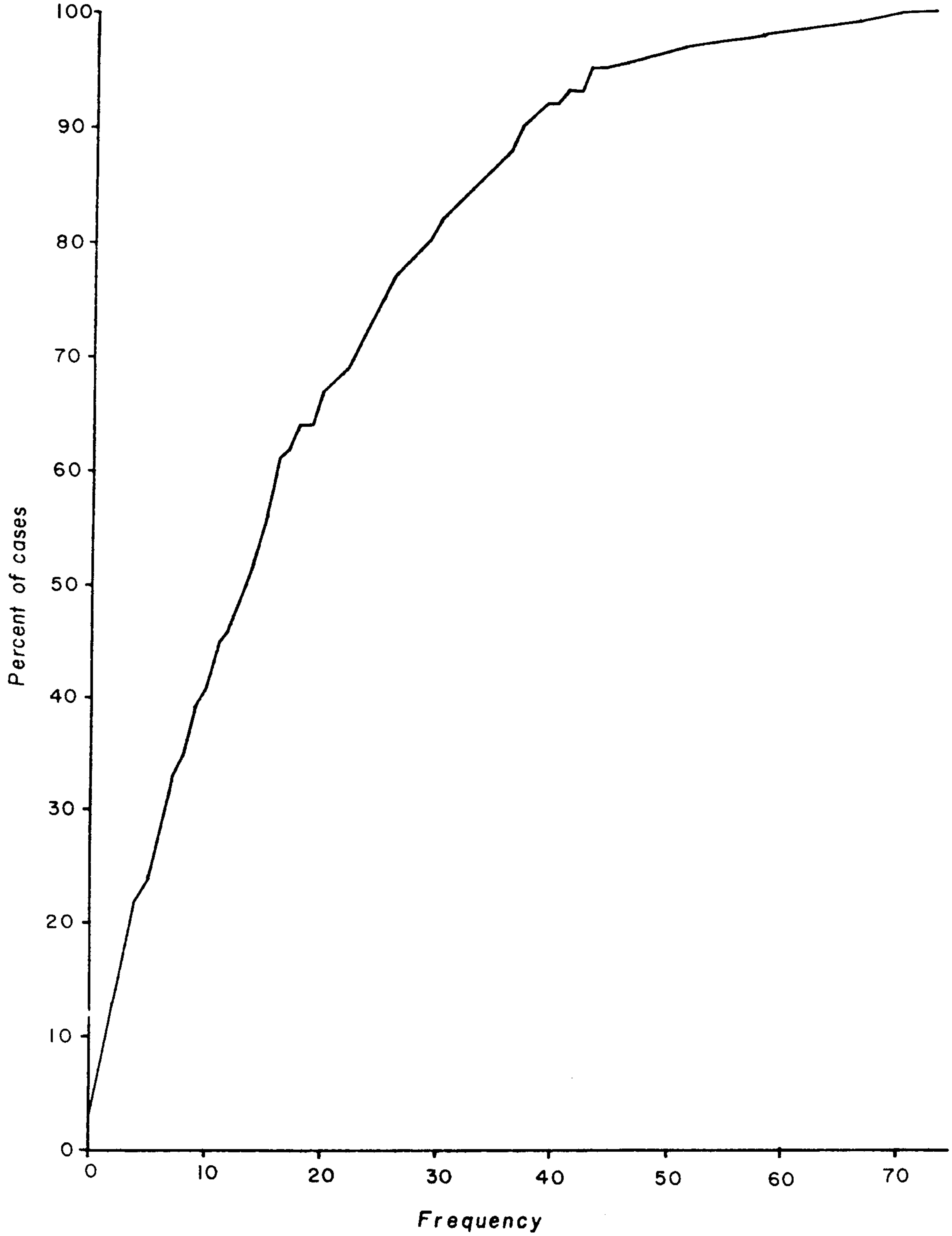


Figure 6b. Cumulative frequency distributions of debris classes – debris smaller than 1/2".

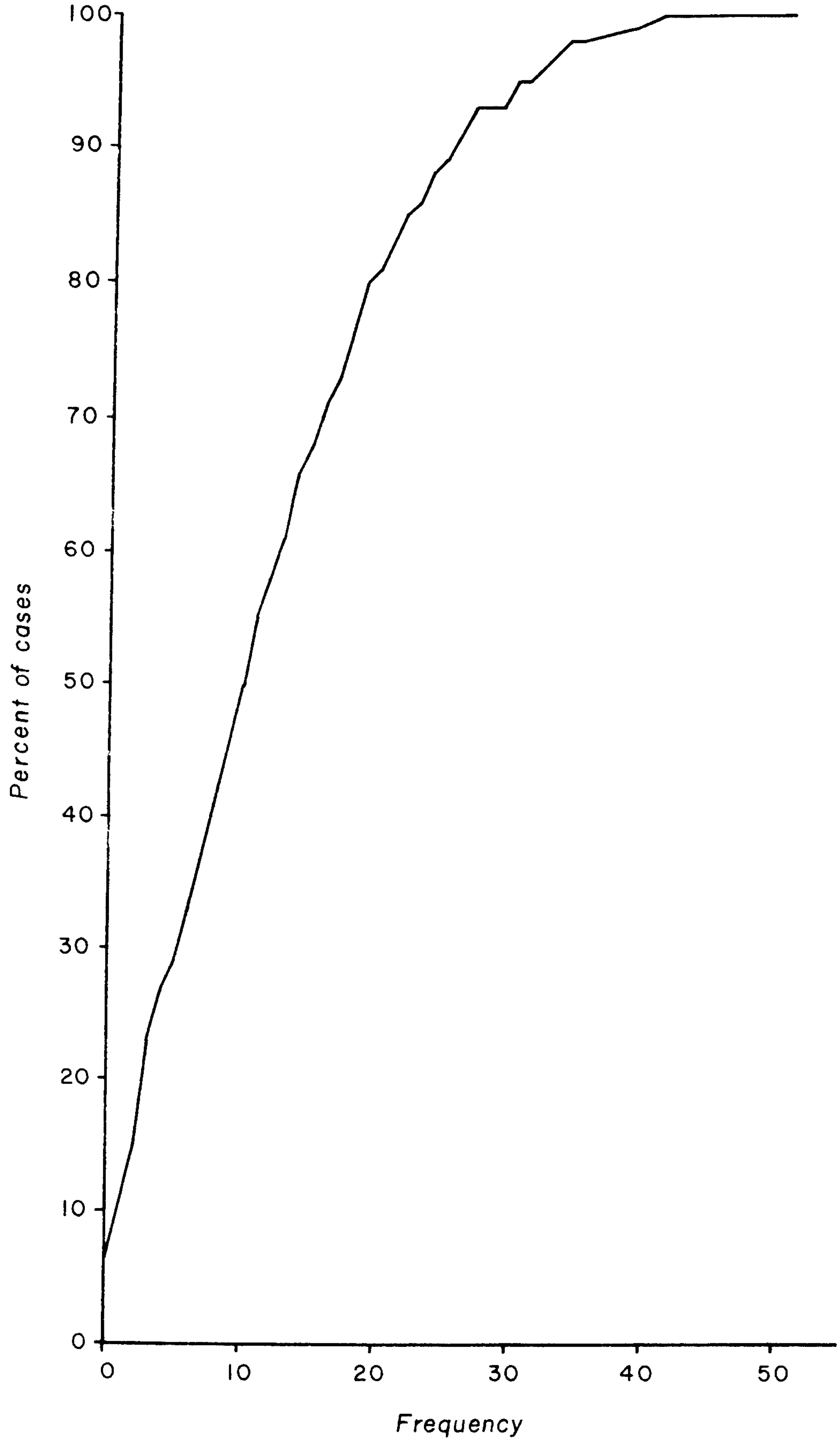


Figure 6c. Cumulative frequency distributions of debris classes — debris 1/2" to 2".

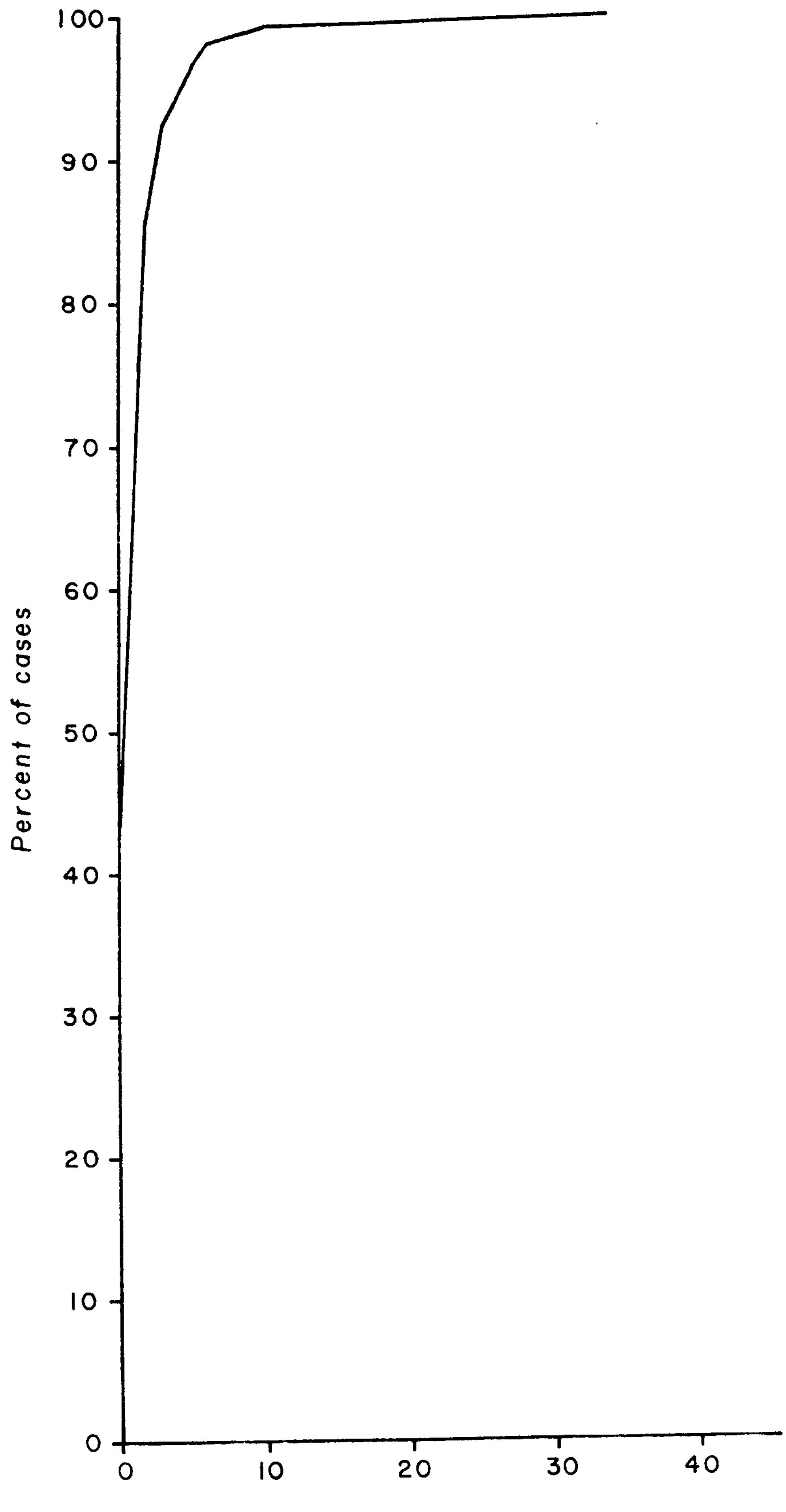


Figure 6d. Cumulative frequency distributions of debris classes – debris larger than 2".

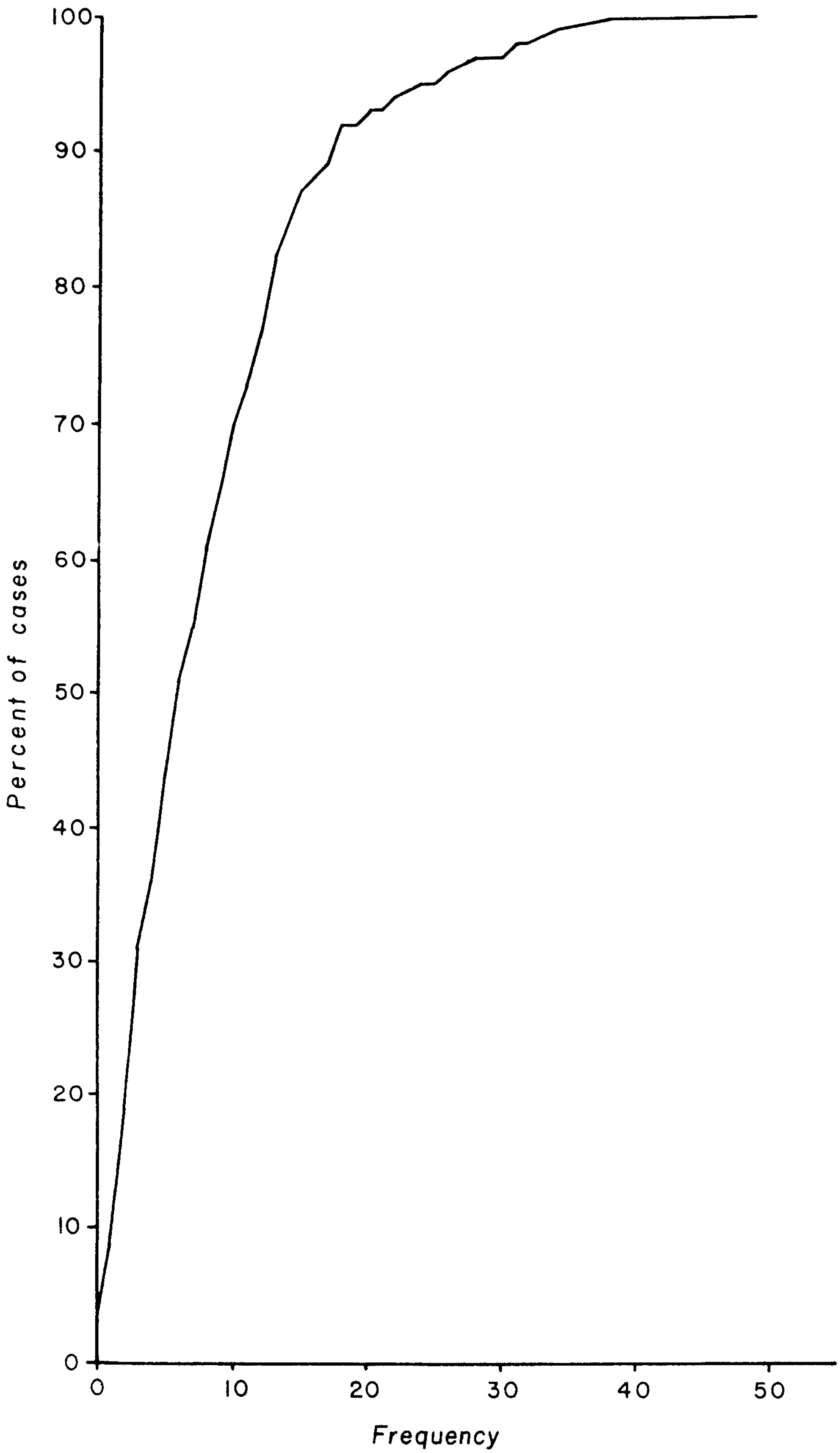


Figure 6e. Cumulative frequency distributions of debris classes — rough rock.

could have potentially biased the amount of debris observed. It is also quite certain that all vegetation will disappear sometime after inundation, and will provide uniform observation conditions throughout the transect. It will thus be useful to know if and, if so, how the differential vegetation in July 1978 biased the inventory.

If the amount of debris in a square depended in part on how visible the surface was, then there should be a relationship between the predictor and criterion variables in a multiple regression. To describe this relationship, the five classes of debris were used as the predictor variables, the ground cover (scaled in equal classes as 1 - 4) as the criterion. The statistics of the analysis are presented in Table 1. A moderate relationship does exist, although only slightly over 19% of the value of ground cover could be predicted from amount of debris. The standard error (standard deviation of residuals) indicates that, on the average, the predicted value of ground cover (on a scale of 1 - 4) will be 1.24 units in error. Not surprisingly, it is the amount of small debitage (<1/2"), followed in order by medium debitage (1/2-2"), and rough rock that best predict the value of ground cover. Tools (which tend to be large, but to occur in low frequency) and large debitage (>2") have virtually no predictive power. The negative relationship between amount of small and medium debitage and ground cover suggests that these categories are, not unexpectedly, underrepresented in those squares with heavy ground cover.

While the amount of ground cover is beyond the control of the archaeologist, it is to be hoped that the identity of the surveyor of a square will have little effect on the amount of debris counted in a given square. To counteract possible bias being introduced by different observers, collection was randomized. That is, squares were inventoried in order; as soon as an observer finished one square she/he did the next one in order. Evaluation of observer by percent ground cover in a square suggests a random relationship (χ^2=34.87, DF=39, p>.10) between the two variables. Even if different observers were somewhat biased, the areal patterns should not be.

In general, then, the data collected by the Truman Reservoir project for the National Reservoir Inundation Study should be sufficiently reliable for comparisons to be made with data collected during future monitoring of the site. It should be remembered, however, that differential ground cover in 1978 may have influenced the counts of smaller debris classes, leaving them underrepresented in the inventory.

TABLE 1

MULTIPLE REGRESSION - DEBRIS COUNTS AND GROUND COVER

Multiple R	= .44	F-Ratio	= 11.81
R^2	= .19	DF	= 5, 249
Standard Error	= 1.24	p	<.001

Independent variables:

	B	Beta	F
Rock	.026	.147	6.032*
Tools	.078	.027	0.216
Small Deb.	-.029	-.317	22.222*
Med Deb.	-.031	-.216	9.909*
Lrg Deb.	.016	.033	0.312

*Value of the F-ratio has a probability of less than .05

PREDICTING THE EFFECTS OF INUNDATION

In this last section the specifics of the Truman Reservoir control are briefly related to models of reservoir dynamics and artifact movement in an attempt to generate predictions of inundation effects on surface distributions at 23SR189. The effect of inundation on surface distributions is not known. However, Lenihan, et al. (1977: 74) predict that

> standard archaeological survey procedures conducted to relocate archaeological sites following inundation will not yield comparable pre- and post-inundation results. This will be most evident in sites that are either buried beneath silt or greatly disturbed by mechanical activity.

Garrison (1975, 1977) has presented a qualitative model of reservoir dynamics which may be used to predict the inundation impact on 23SR189. In Garrison's model, a reservoir will have three zones: active, transitional, and static - from top to bottom. The active zone may be as deep as 10 m in the summer, but is only 2 or 3 m deep the rest of the year (Garrison 1975: 282). It is obvious that the inventoried transect at 23SR189 will be in the active zone year-round. Mechanical effects will therefore be those appropriate to this zone, particularly waves, currents, and erosion (Garrison 1975: 284; 1977: 153). As such, Garrison (1975: 284) predicts that

> sites in the Active Zone of reservoirs such as these [i.e., those used for power generation, as will be Truman] will undergo a cycle of Exposure-Inundation-Exposure- _ad infinitum_ until the sites are destroyed or until context is so altered as to be of limited use to the archaeologist.

These predictions are qualitative and simply suggest alteration of the distribution. Not specified is the rate of alteration and whether or not this rate could be expected to vary for different debris classes or ground slope conditions. Although no studies exist that would allow more precise expectations to be formulated, a brief consideration of the nature of the archeological remains would suggest the following.

Two different natural forces will be operating to disturb the positions of the surface debris at 23SR189 - viz., hydraulic activity and gravity. The sizes of the individual pieces of debris counted in the transect vary from less than 1/2" in maximum dimension to over 2" in maximum dimension

(sometimes well over 2"). Larger amounts of energy are required for movement of larger pieces. It is therefore expectable that the smaller the piece, the more likely it is to be in motion at any given time, and therefore, the more likely it is to be moved randomly about the surface. In contrast, will be expectations for larger pieces. These will be less likely to be in motion at any given time and thus, less subject to random horizontal movement due to fluvial action. The matrix on which they are resting, however, will be composed of fine particles of sediment which are likely to be in suspension much of the time. The "surface" being in a rather viscous state, gravity will likely subject the heavier pieces to both downslope movement and burying.

Overall, therefore, destruction of surface contexts will proceed at an unknown rate, but should proceed differentially for different sizes of debris. Smaller pieces will be moved more frequently, but will probably be randomly redistributed about the surface. Larger pieces, on the other hand, will be less subject to random redistribution, but should be more subject to downslope movement and possibly increasing obscurity.

Use of surface distributions for delineation of intrasite activity distributions is dependent upon the relative distributions of different debris classes. Given that these classes will be differentially subjected to destructive forces, it is to be expected that inundation will completely jumble intrasite surface relationships, rendering them meaningless as a clue to subsurface relationships.

REFERENCES CITED

Binford, Lewis R.
1970 Archaeology at Hatchery West. Society for American Archaeology Memoir No. 24.

Downer, Alan S., Jr.
1977 Tool kits, surface collections, and factor analysis at the Phillips Spring Site, 23HI216, Missouri. Plains Anthropologist 22 (78, Pt. 1): 299-311.

Gallagher, Joseph G.
1978 Scarification and cultural resources: an experiment to evaluate serotinous lodgepole pine forest regeneration techniques. Plains Anthropologist 23(82, Pt. 1): 289-299.

Garrison, Ervan G.
1975 A qualitative model for inundation studies in archeological research and resource conservation: an example from Arkansas. Plains Anthropologist 20(70): 279-296.

1977 Modeling inundation effects for planning and prediction. In Conservation Archaeology, edited by Michael B. Schiffer and George J. Gumerman, pp. 151-156. Academic Press, New York.

Healan, Dan M.
1972 Surface delineation of functional areas at a Mississippian ceremonial center. Missouri Archaeological Society Memoir No. 10.

Kay, Marvin
1972 Spatial dynamics of the Imhoff Site. Unpublished M.A. Thesis, Department of Anthropology, University of Missouri-Columbia.

Lenihan, Daniel J., et al.
1977 The preliminary report of the National Reservoir Inundation Study. U.S. Department of the Interior, National Park Service.

Redman, Charles L., and Patty Jo Watson
1970 Systematic, intensive surface collection. American Antiquity 35(3): 279-291.

Roper, Donna C.
1976 Lateral displacement of artifacts due to plowing. American Antiquity 41(3): 372-375.

Trubowitz, Neal L.
1977 The persistence of settlement pattern in a cultivated field. Reports of the Archaeological Survey 8(33). Department of Anthropology, State University of New York-Buffalo.

PART III.

TEST EXCAVATIONS, 1977-1979

PART III

CHAPTER 1

PRE-HYPSITHERMAL AND HYPSITHERMAL AGE SITES, 1977

by

Janet E. Joyer, Donna C. Roper,
and Michael R. Piontkowski

Site 23BE185

LOCATION AND BACKGROUND

Site 23BE185 is located 20 meters north of the Pomme de Terre River, near its confluence with the Osage River (Fig. 1.1). The site is on the first terrace above the river in a field with a dense cover of weeds. The site had been discovered in June 1975 during Stage 1 survey; it was observed in an area near the edge of the field where the ground was visible. Surface material included Hardin, Hidden Valley and Langtry points. The lithic clusters could be recognized, one on either side of a finger of trees along the river. The site is approximately 8,000 square meters and slopes slightly to the south.

EXCAVATION AND STRATIGRAPHY

Two 1 x 1 m square test units, 15 meters apart, were opened in the middle of the western cluster, the densest of the two lithic clusters. Unit 2 was north of unit 1. A third test unit was opened ten meters north of test unit 2. A fourth 1 x 1 m square test unit was placed in the eastern lithic concentration near the river bank on the other side of a projection of trees.

The plowzone in each unit was removed as one level. Five centimeter arbitrary levels were used thereafter. Levels were excavated by skim-shoveling. All soil was passed through a 1/4" mesh screen. The vertical datum for each unit was the surface of the ground at the northwest corner of that unit.

Test unit 1 was excavated to a depth of 50 cm below the surface. Unit 2 was excavated to 1.0 meters below the surface, well below the deepest occurrence of cultural debris. Test unit 3 was excavated to 75 cm and unit 4 to 50 cm below the surface.

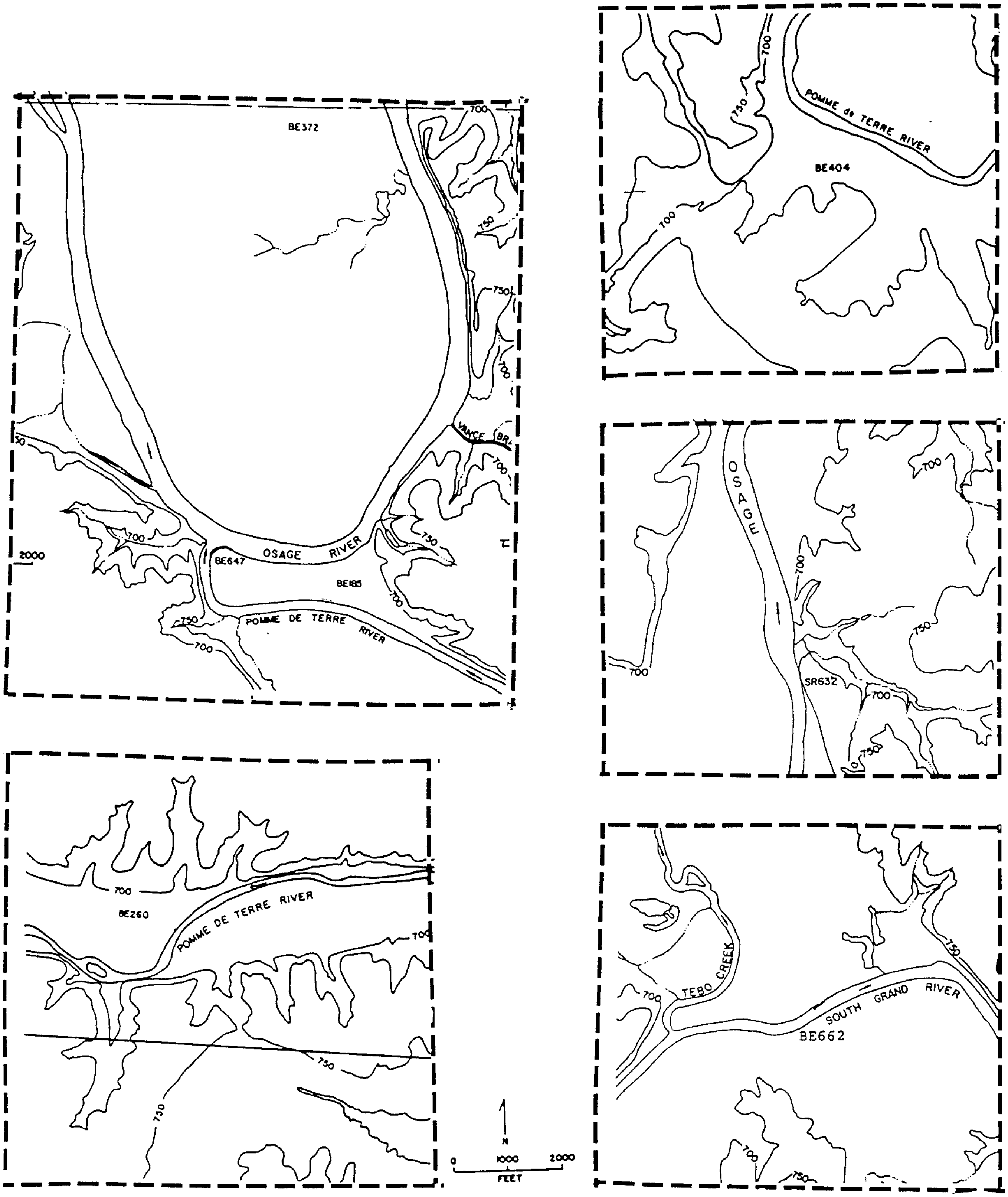


Figure 1.1. General location maps.

The stratigraphic layers were virtually horizontal (Fig. 1.2). The plowzone of test unit 2 consisted of grey silt. Below the plowzone, the soil was a mottled greyish brown with decreasing amounts of manganese deposits and an increasing clay content. In the lowest twenty centimeters of the unit, light colored ash occurred in swirls.

Test unit 3, to the north of test unit 2, and very slightly upslope, was much the same in soil type, although the widths of the layers varied somewhat from those in unit 2. The plowzone consisted of two layers: a recent plowzone (surface to 10 cm below the surface) and an older plowzone (10-15 cm below surface). Both were grey silt, the distinctions occurring in the shade of grey (the recent zone is lighter) and the structure (the recent zone is looser). The next layer (15-22 cm below surface) was clayier and contained manganese inclusions but was the same dark grey as the layer directly above. The next layer (22-40 cm below surface) was still clayey with manganese inclusions but was a tan to light brown color. This layer graded into the lowest layer, a tan to light brown clay with no manganese inclusions (55-70 cm below surface).

Test unit 4, to the east had a single plowzone — a light grey, single-grained silt (10 cm deep). The next layer, to a depth of 20 cm, was a dark grey compact silt exhibiting angular breakage. Manganese inclusions occurred in this layer. The deepest layer excavated in this unit (from 20 to 60 cm) was a light brown to red clay with manganese deposits still present. An intrusion was observed in the southern third of the west wall, from the deepest layer down 21 cm, of red clay (assumed to be a rodent burrow).

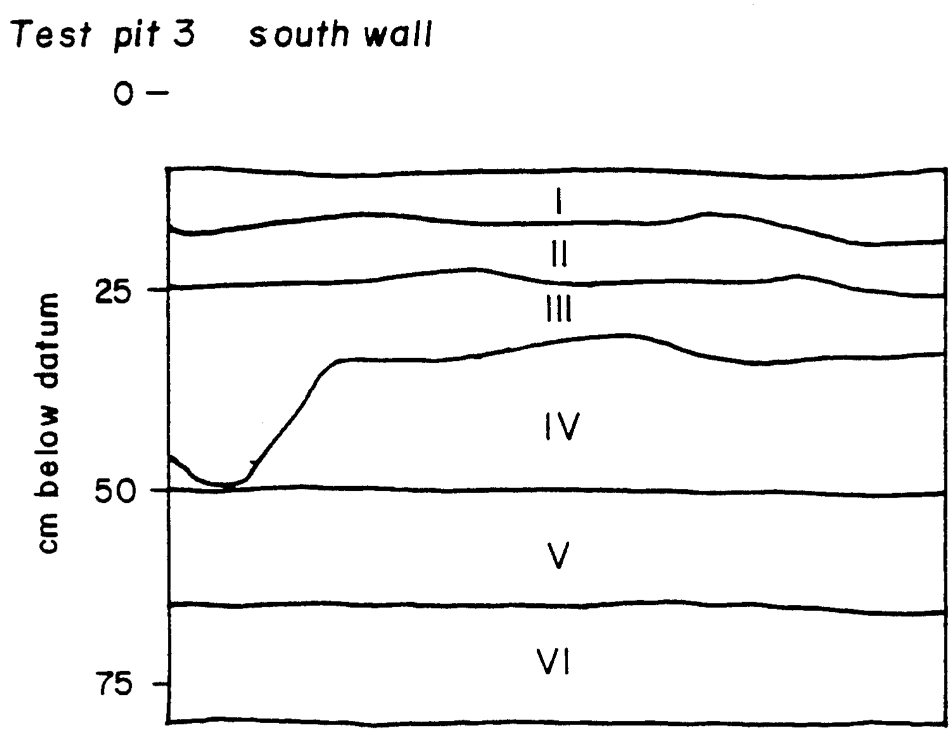
The most significant differences in stratigraphy, then, among the test units is the color of the subplowzone clay. In the two western units profiled, it was greyish brown and light brown. In test unit 4 to the east, it was reddish brown.

THE COLLECTIONS

As with all sites described in this chapter, the collections are comprised entirely of lithics, primarily debitage (Tables D-1.1 and D-1.2). Some bifaces and unifacial tools were, however, recovered from the surface of the site.

Debris density was moderate in Test Pit 1. Excavations continued only to 50 cm below the surface but recovered sparse material below the plowzone.

Test pits 2 and 3 contained a relatively light debris density with the maximum density at a depth of 50 to 60 cm



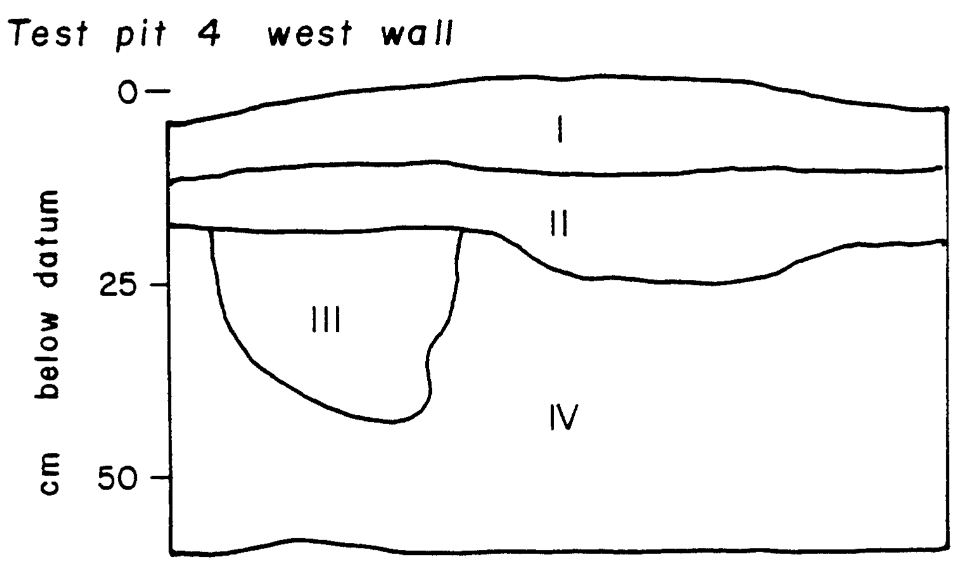


Figure 1.2. Excavation profiles — 23BE185.

below the surface. Below this level debris density dropped off sharply to the bottom levels excavated. Three bifacial fragments and nine unifacial tools were recovered from these test pits, most of them between 50 to 65 cm below the surface. None of these artifacts were temporally diagnostic.

Test Pit 4 contained the slightest debris density of any test pit at this site. Only debitage was recovered in this pit.

Only a single projectile point from the 1977 test was identifiable, and it was a surface find. It was identified as an Afton point (Category 313). A reexamination of the original survey specimens suggests that the "Hidden Valley" point is more probably a Standlee point and that unidentifiable corner-notched points were collected. These identifications suggest that the site is most likely multicomponent and was perhaps occupied at several times during the Late Archaic and Woodland periods.

CONCLUSIONS AND RECOMMENDATIONS

Site 23BE185 was clearly the scene of cultural activity at one or more times, probably within the last four millennia. Such occupation or occupations were never intense, however. Artifact and debris classes represented in the surface and excavated collections suggest the predominance of maintenance activities and the casual or incidental use of flakes for tools.

Site 23BE185 is clearly on and in Holocene age Rodgers Alluvium and is vertically spread throughout nearly 3/4 meter of the profile in some parts of the site. A modal density of debris occurs at 50 to 60 cm below the surface, probably representing at least one of the occupations of the site. The subsequent recognition of the possible role of pedoturbation in distributing material through a profile leads to an interpretation of severe natural disturbance of the sparse deposits. Because very little additional information is likely to be obtained from further investigations at this site, and because the low elevation (660' AMSL) of the site ensured its inundation shortly after investigation, no further work is recommended.

Site 23BE260

LOCATION AND BACKGROUND

Site 23BE260 was recorded in the summer of 1975 during Stage 1 survey. The site is located on the inside of a

meander loop of the Pomme de Terre (Fig. 1.1) on an east-west trending terrace several meters above the river. This terrace has been mapped (Haynes 1977: 24) as a Rodgers Terrace. A low gentle terrace scarp face to the south indicates the contact between the older Rodgers terrace and the modern floodplain (T-0) or Pippins Alluvium.

The site 23BE260 is bounded on the south and east by the river. Two intermittent streams flow into the Pomme de Terre River at the site. Erosion is causing relatively rapid slumpage of the river bank at this point; however, the major concentration of material is back from the river and is presently unaffected.

EXCAVATION AND STRATIGRAPHY

A crew of six returned to the site in June 1977 to test the site for early materials. Initial identifications of projectile points suggested that a Hidden Valley point (Early Archaic) and several Woodland points had been collected during the initial survey. Preliminary shovel testing suggested little subplowzone depth at the southern and eastern perimeters of the site and greater depth at a high point on the terrace. Two test units were, however, placed in an unplanted portion of the field near the eastern edge of the site until arrangements for crop damages could be made with the lessee and units placed on the higher portion of the site.

The two units were each 1 x 2 meters, in anticipation of perhaps more than an incidental depth to be excavated. They were placed 50 meters apart. The plowzone was removed as a single unit and 5 cm levels were excavated below the plowzone. All soil was initially passed through 1/4" mesh screen. Below 35 cm below the surface, however, the compactness of the clay precluded efficient screening. Levels were, therefore, skim-shoveled only in 10 cm levels. A small column of soil in the northwest corner of each unit was saved for possible flotation.

The soil profiles for these two units were very similar (Fig. 1.3) except for the top ten centimeters. In unit 1 the top layer was a light grey silt (recent alluvium). In unit 2, the top ten centimeters consisted of a light brown silt with much humus and probably was recently plowed. The next layer, ten to twelve centimeters thick in both units, was a light brown, compact silt. The contact between this horizon and the next was very gradual, with a transition zone approximately 13 centimeters wide. The next level was clayier than the previous one but still light brown and silty. This horizon became increasingly red with

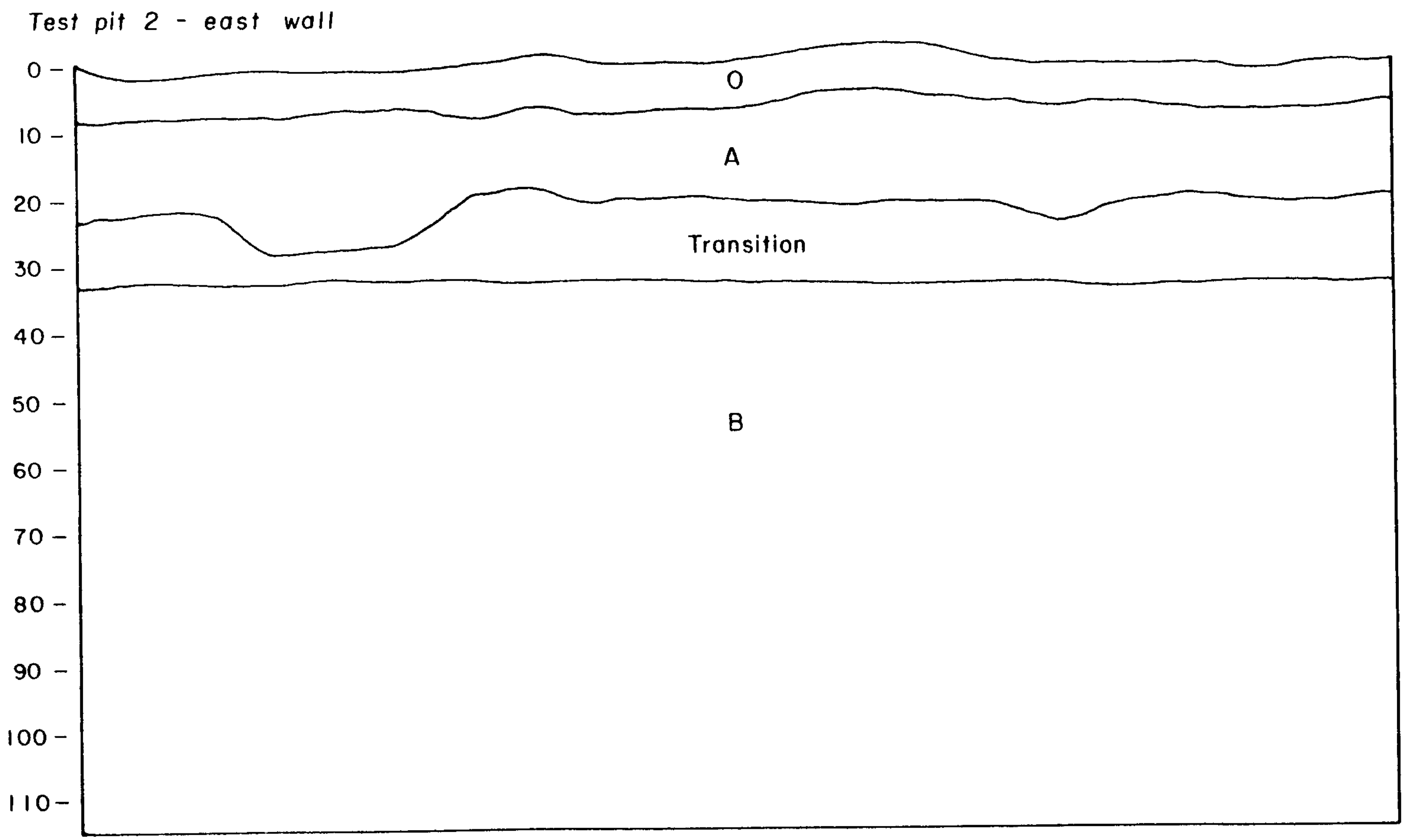


Figure 1.3. Excavation profile — 23BE260.

depth. Charcoal flecks were present in the soil of all levels in both units. The position of the bulk of the cultural material was at the top of the reddish level.

When both test units had reached a depth of 115 cm below surface, the units were abandoned, supposedly temporarily. Dr. C. Vance Haynes was planning to put a backhoe trench somewhere in the vicinity, and it was decided that no more testing would be done until the trench had been dug and the stratigraphy could be examined. Efforts to make arrangements for both trenching and test excavation had been stymied by the inability to contact the lessee listed with the Corps of Engineers real estate office. It was not until nearly the end of the season that it was learned that he had died the previous spring – apparently his telephone remained connected with no one at it.

The top levels of the site contained little cultural material. The plowzone of test unit 1 produced a piece of wire, a rodent molar, and a few flakes. Even fewer flakes were found in levels between the plowzone and 55 cm below the surface. Below 55 cm the unit was culturally sterile. Excavation was continued to a depth of 115 cm below the surface in order to detect a possible buried horizon. Because the deposits continued to be sterile, a judgement was made that further excavation would be unproductive.

Test unit 2 yielded a projectile point identified as Jakie Stemmed (Category 371) and a few flakes in the plowzone. Below the plowzone, few lithics were encountered until the 30-35 cm level where two pieces of a single broken biface were found and flake density was considerably higher than in the higher levels. In the next level, however, the lithic density again fell to almost nothing. Until the excavations were terminated at a depth of 115 cm below the surface, lithic density never was zero but was never much greater than one or two flakes per level. At a depth of 115 cm below the surface, judgement suggested the excavation be terminated.

Haynes did eventually have a backhoe trench cut through the field which contained 23BE260 and 23BE261. The trench which trended north-south extended from the Pomme de Terre River approximately and dissected both cultural deposits.

The recovery of a Smith point at 175 cm below the surface in the trench indicates that there is a buried Late Archaic component below the Woodland occupations. This temporal identification is supported by two radiocarbon dates of 4585 ± 120 B.P. (UCR-820) and 3985 ± 130 B.P. taken from dispersed charcoal samples recovered near the Smith point at 250 cm and 275 cm below the surface respectively.

Based on the depth of the Late Archaic component, the materials recovered from the two test pits can likely be attributed to a Woodland occupation. The possibly Hidden Valley Stemmed point collected during the original survey is probably a large Standlee point. Excavation in these squares was terminated at a depth of 115 cm – above the Smith point. Surface points (Rice Side-Notched, Scallorn, Afton, and Standlee) from the original survey are consistent with such a determination, as well as points recovered during monitoring in 1977 and 1978 (Categories 305, 307, 310, 321, 330).

CONCLUSIONS AND RECOMMENDATIONS

The testing results at 23BE260 are ambiguous. The surface collections suggest the presence of an apparently rather sparse Woodland component, with an apparent mixture of at least one clearly out of context Middle Archaic point.

Hand excavations to a depth in excess of a meter failed to reveal any deeper occupations, however, the excavation of a backhoe trench for geomorphic study recovered a single Smith point at a depth of 175 cm. Examination of the backhoe trench in the vicinity of the location of the point revealed no additional cultural material.

The site was inundated in late 1978 or early 1979. Had that not occurred, additional work might have been recommended, such work to consist of additional backhoe stripping at the high point of the terrace to further explore the context of the Smith point. The sparse and possibly mixed nature of the surface component, however, suggests that little further information would have been gained from continued investigations of this component.

Site 23BE372

LOCATION AND BACKGROUND

Site 23BE372 was originally recorded during the Stage 1 survey in July 1975. It is located in the Peal Bend area of the Osage River bottoms in Benton County (Fig. 1.1). At the time of its original recording, the site was in a plowed field, as it also was at the time of the June 1977 test excavation. The collection made at the time of the original survey contained bifaces, cores, debitage, and four projectile points, one of which was identified as Graham Cave Side-Notched.

The site is situated on a north-south oriented lobe of a larger terrace to the south. The Osage River flows north 350 meters east of the site. The general soil

association is the Hartville-Ashton-Cedargap-Nolin association characteristic of the bottomlands of Ozark streams (Allgood and Persinger 1979).

EXCAVATION AND STRATIGRAPHY

Two 1 x 1 meter test units were situated in an unplanted strip along the northern edge of the field. Test unit 2 was placed at the highest point of the site; test unit 1 was placed 10 meters to the east at a slightly lower elevation. Soil was removed in 5 cm levels by skim-shoveling and was passed through 1/4" mesh screen.

The stratigraphy in each unit was similar (Fig. 1.4). Each had a brownish color, silty textured plowzone with a darker, clayier subsoil. The lower levels of each unit were increasingly sandy in texture and lighter in color. At the base of the excavations the matrix was yellow-grey with black and red mottling. Large and frequent chunks of sandstone and precipitates of iron and manganese were frequent.

THE COLLECTIONS

The collections from the excavations at 23BE372 are entirely comprised of lithics, the majority of which is debitage (Tables D-1.3 and D-1.4). Some biface fragments and unifacial tools were, however, collected from the surface of the site prior to excavation.

The debris density was light in test unit 1 and was, in fact, concentrated in the plowzone. No cultural material was encountered below 40 cm below the surface. Debris density was slightly higher in test unit 2 but was virtually exclusively comprised of flake fragments, shatter, chunks and miscellaneous rock. Density also fell to zero below 40 cm in this unit.

The surface collection therefore contains slightly more information about the cultural units represented at the site. Three projectile points were identifiable. One falls within Category 306 which is regarded as dating to the period of the Late Archaic-Woodland transition, one falls within Category 305 which is a Late Woodland category, and the third was placed within Category 334 which also dates to the Late Woodland or Mississippian period.

SUMMARY AND CONCLUSIONS

The presence of Late Archaic-Woodland and Late Woodland materials in the surface collections plus the Early Archaic Graham Cave point collected during the original survey suggest that 23BE372 is a multicomponent site whose cultural deposits are mixed in a very shallow cultural layer. The

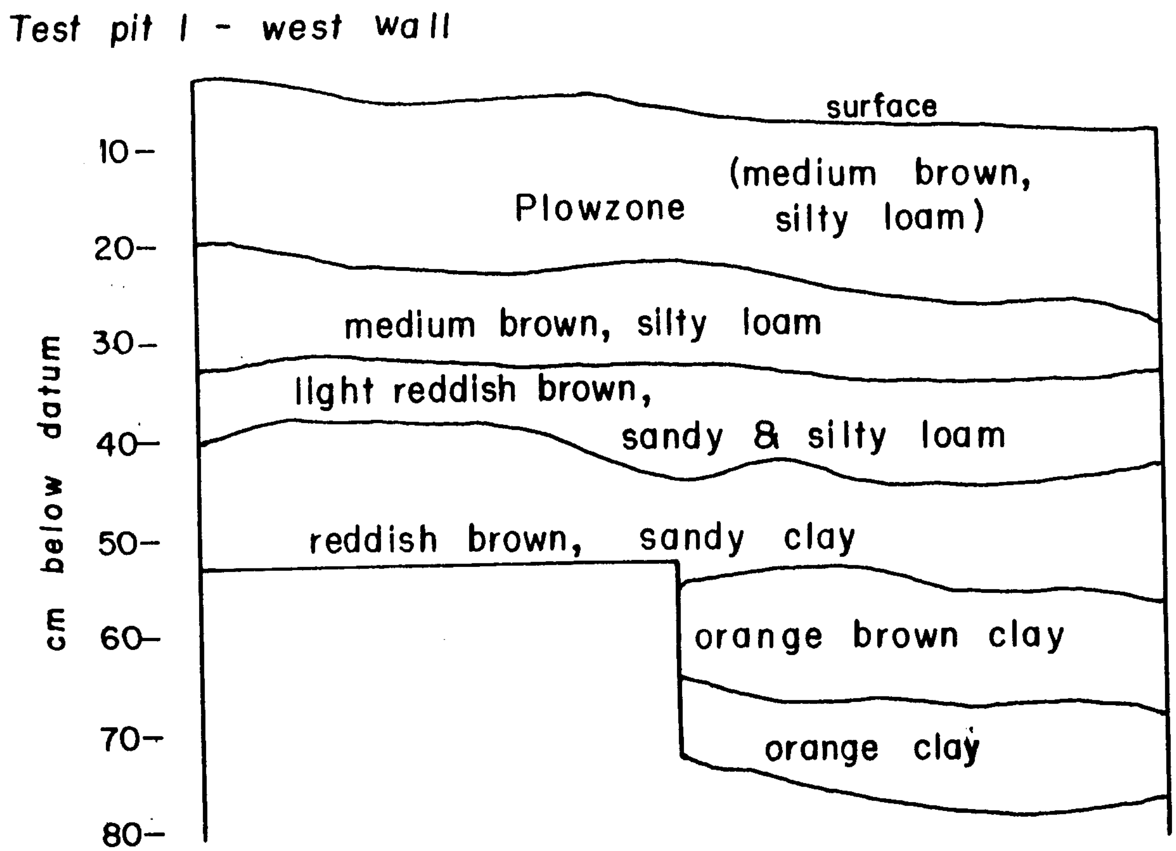


Figure 1.4. Excavation profile — 23BE372.

nature of the excavated collections suggests that, in spite of apparent repeated occupations, the site was never used intensively. At the time of the test excavations, criteria for recognition of variously aged land surfaces were not known. Retrospective inspection of profiles and stratigraphic descriptions makes it clear that the land surface on which this site is located is too old to be expected to contain deep cultural deposits. Site 23BE372 was inundated in late 1978 or early 1979. However, because of the mixed nature of the cultural components and their shallow depth, no further work would have been recommended had inundation not occurred.

Site 23BE404

LOCATION AND BACKGROUND

Site 23BE404 was originally recorded during the Stage 1 survey in July 1975. It is located along the lower reaches of the Pomme de Terre River in Benton County (Fig. 1.1). At the time of its original survey, the site was first observed along one edge of a cultivated field and appeared to cover approximately 3000 m^2. One projectile point, originally identified as a Big Sandy point (Roper and Piontkowski 1977), bifaces, cores, and debitage were collected during the initial survey.

The site is situated on a terrace of the Pomme de Terre River. The river itself flows in a course about 300 m northeast of the site. The general soil association is the Hartville-Ashton-Cedargap-Nolin association characteristic of the bottomlands of Ozark streams (Allgood and Persinger 1979).

EXCAVATION AND STRATIGRAPHY

Three 1 x 1 m test units were placed at the site. Unit 1 was placed 2 meters from the woods at the south edge of the field and was excavated to a depth of .3 meters below the surface. The 20 cm thick plowzone was removed as a single unit, and two 5 cm arbitrary levels were excavated below the plowzone. The plowzone sediments were a light greyish brown in color and silty in texture with a high gravel content. The subplowzone deposits were a markedly lighter yellowish-brown in color and sandier textured with lower gravel content.

Test units 2 and 3 were placed 23 and 41 meters, respectively, northeast of unit 1 and were placed between rows of beans to minimize crop damage. Surface evidence suggested that this was the densest part of the site. Excavation techniques were identical to those used in test unit 1. Test unit 2 was excavated only to a single level

below the plowzone and unit 3 only through the plowzone. Stratigraphy in both units was the same as in unit 1.

THE COLLECTIONS

The collections from 23BE404 are comprised exclusively of lithics, including a very large amount of miscellaneous rock (Tables D-1.5 and D-1.6). A single biface fragment was recovered from the plowzone of test unit 3; otherwise, the entire excavated collection is shatter, flake fragments and four whole flakes.

The surface collection contains slightly more information, however, further temporal placement is impossible as the two projectile point fragments (Table D-1.5) were unidentifiable. Nine fragments of unifacial tools plus two modified flakes as opposed to six bifacial fragments suggests an incidental or casual use of lithic resources and a predominantly maintenance activity being performed at the site.

SUMMARY AND CONCLUSIONS

The light debris density and representative of well-made tools as fragments only suggests that 23BE404 was used for a very short period of time and then used casually. Although criteria for identification of variously aged land surfaces were poorly known at the time of the June 1977 test, later consideration of the data suggests that the land surface is too old to contain deep cultural deposits. Even had this site not been inundated in late 1978 or early 1979, its nature and potential would have been considered to have been determined and no further work recommended.

Site 23BE647

LOCATION AND BACKGROUND

Site 23BE647 was originally recorded in the fall of 1976 during an examination of riverbanks for buried sites. It is located at the confluence of the Osage and Pomme de Terre rivers on the right (east) bank of the latter (Fig. 1.1). Bifaces and debitage were originally found eroding from a 20 meter long area along the riverbank. Although no projectile points or other potentially diagnostic materials were located at the time of the original examination, it was suspected that the site represented a buried component that would almost certainly prove to be Archaic, given its context.

The site has no surface expression and therefore was known only to cover an indeterminant amount of area along the two rivers. Given its buried context, it is clear that it is in Holocene alluvial terrace. Soils on top of this

terrace are therefore within the Hartville-Ashton-Cedargap-Nolin association of the Ozark stream bottoms (Allgood and Persinger 1979).

EXCAVATION AND STRATIGRAPHY

Eroding river cutbanks are often likely to contain sufficient slumping and sliding of deposits which obscure the exact provenience of buried cultural deposits. Since the exact depth from which the materials were eroding was unclear, testing consisted of the placement of five 50 cm wide profiles along the bank. The locations of the profiles were marked by stakes on the surface. The profiles were cut by troweling the bank to form vertical surfaces and were cut from the top down, generally to a depth of 155 cm below the present ground surface. Vertical provenience was recorded in centimeters below the ground surface and was kept in 5 cm levels.

Profile 1 (Fig. 1.5) was cleared from the surface to 170 cm below the surface. The first layer of soil was a sandy loam. At 85 cm below the surface, the color was brownish red, mottled with grey and white and was sandier. From 150 to 170 cm the soil was a compact, brownish clay.

Profile 2, seven meters northeast of profile 1, appeared much the same. The first layer (to 60 cm) was whitish and sandy. The next one (60-109 cm) was clayier, with charcoal specks and white deposits. The mottling seen in profile 1 was present in this layer also. The soil was an orangey color. The next layer, however, was one not represented in the first profile. It was a layer (31 cm thick) of whitish soil. At 140 cm below the surface, the soil became dark brown with a blockier structure, much like the soil at the same depth in the first profile.

Profile 3, six meters northeast of profile 2, showed the same progression from a light grey single-grained sandy soil to a less sandy (clayier), more orange soil. The soil became more compact, clayier and darker brown from 150 to 280 cm.

Profile 4, one meter northeast, was much the same with an overall change from a dark brown, silty sand topsoil, through a reddish brown sandy soil, to a more compact clayey/sandy soil.

Profile 5, three meters northeast of profile 4, showed the same changes in soil. A single-grained light brown silt humus graded into a sandier but more compact soil. Below was a clayier soil exhibiting angular breakage.

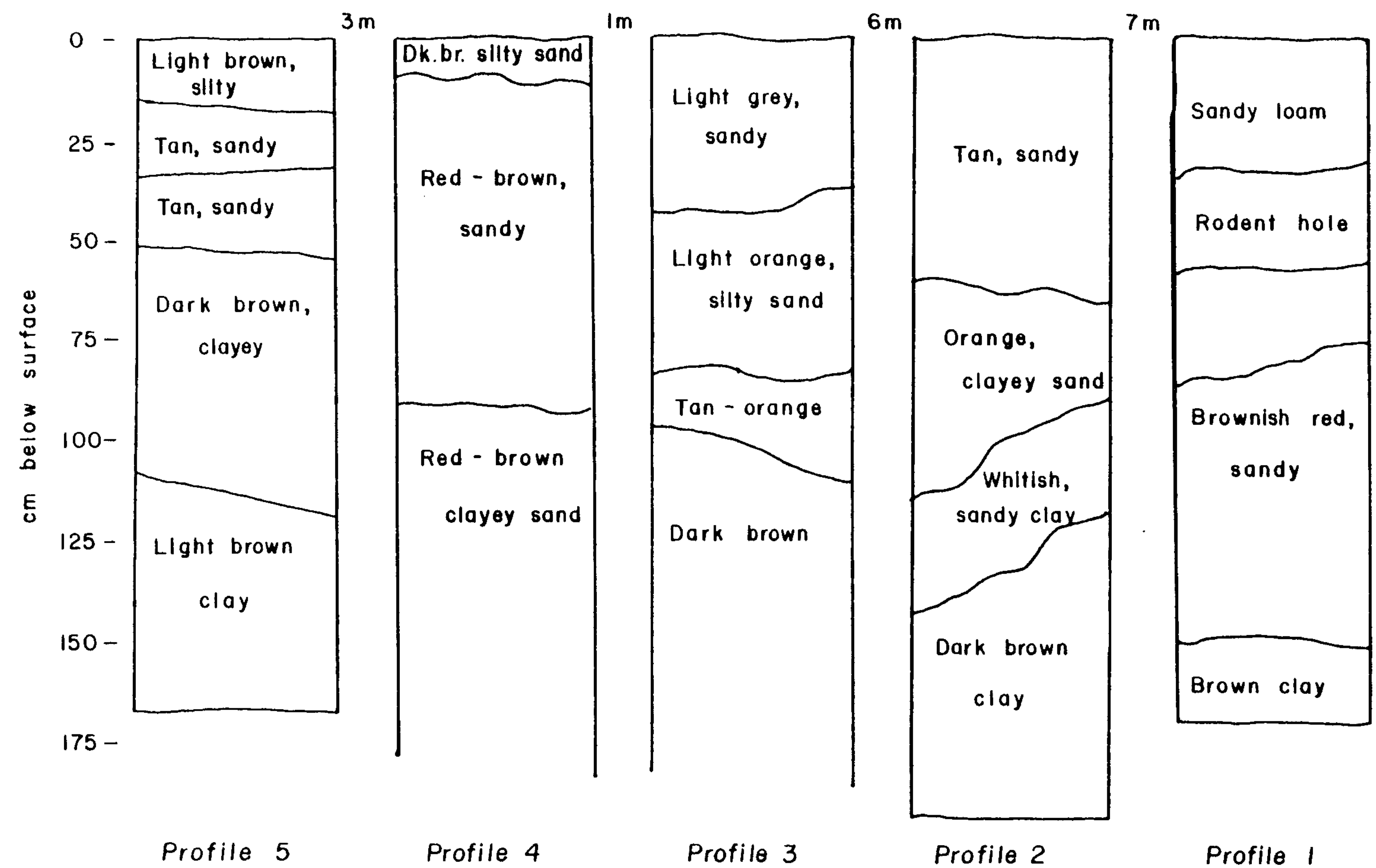


Figure 1.5. Excavation profiles — 23BE647.

Charcoal was present in all profiles from the surface to a depth of 110 to 160 cm, depending on the profile. Pieces of water-worn chert occurred intermittently throughout all levels of the profiles. Generally the soil contacts in the profiles were very gradual.

The soil profiles show that the soil sequence at this site generally consisted of soils with a high percentage of sand. It began with a brown silty sand, then graded into a tan/orange sand with increasing clay content, and gradually became a dark reddish brown sandy clay. The little cultural material recovered was found mainly in the transition zone between the tan/orange and reddish brown layers, where clay content was steadily increasing.

THE COLLECTIONS

The collection from 23BE647 contains exclusively lithics, the majority of which is debitage (Table D-1.7). The exceptions are six biface fragments, four of which were from uncertain provenience (found on the eroded vertical surface) and two scrapers. Debris was primarily unmodified tertiary flakes, flake fragments, and shatter, none of which were found in great frequency, but which did occur steadily throughout the profiles.

The relatively densest level was between approximately 100 and 115 or 125 cm below the surface, although the lower limits varied between squares. Secondary modes also occurred at about 65 to 70 cm below the surface and at 145 to 155 cm below the surface. These secondary peaks were expressed in most profiles.

A single projectile point recovered from uncertain provenience is identified to Category 368. Specimens in this category fit the description of the triangular side-notched points such as those found at the Itasca site in Minnesota, dated between 8000 and 7000 B.P., and at the Simonsen and Hill sites in Iowa and the Logan Creek site in Nebraska, all of which date between 8500 and 7000 B.P. (Shay 1971: 56). These dates suggest an occupation during the Early Archaic period.

CONCLUSIONS AND RECOMMENDATIONS

Site 23BE647 apparently contains an Early Archaic occupation now buried in a Holocene alluvial terrace at the confluence of two major streams. Debris density is very light and is diffused throughout the profile. The potential seemingly exists that the site once contained several vertically separated components whose materials have been subsequently spread through the profile by various pedoturbation processes (see Wood and Johnson 1978 for a review

of such processes). Study of material distributions, particle size distributions, and clay mineralogy at buried sites excavated subsequently to 23BE647 (Solov and Newberry 1978) suggests that this phenomenon is all too common at Truman Reservoir area buried sites. None of these occupations were apparently anything more than casual occupations, producing more than small amounts of debris largely indicative of maintenance activity.

Because of the low elevation at which this site is located (660' AMSL), it was inundated during the extremely heavy rains and flooding of late June 1977. These floodwaters never receded before pre-impoundment of Truman Reservoir and diversion of the Osage River for dam closure construction. However, it is unlikely that further work would have been recommended.

Site 23BE662

LOCATION AND BACKGROUND

Site 23BE662 was originally recorded during the Stage 1 survey in August 1975, at which time it was assigned the number 23BE434. It was rediscovered during the Stage 2 survey in October 1976, at which time it was assigned the number 23BE662. It was only later realized that 23BE434 and 23BE662 were actually one and the same site. The later number is the one used to designate the site here.

The site is located 300 meters southeast of the lower South Grand River in Benton County (Fig. 1.1). During both the August 1975 and October 1976 visits, the field in which the site was located had been plowed and surface visibility was excellent. A variety of tools and debris were, therefore, recovered during these surveys (Table D-1.8). This included projectile points identified as Dalton, Graham Cave (2 specimens), Fresno, flared base (probably Jakie Stemmed), unidentified straight stemmed, and unidentifiable corner-notched.

The site covers an area of approximately 1000 square meters. It is on a terrace of the South Grand River in a wide meander loop of the river and is at an elevation of 660-680' AMSL. Soils of this terrace are the Hartville-Ashton-Cedargap-Nolin association of Ozark stream bottoms (Allgood and Persinger 1979).

EXCAVATION AND STRATIGRAPHY

A six person testing crew returned to the site in June 1977. Since pre-impoundment of the reservoir was scheduled for the following month, the field had not been planted, and it had a heavy cover of weeds, making concentrations

of cultural material almost impossible to discern. Three 1 x 2 meter test units, with the long axis oriented north-south, were placed in the northwest portion of the site. Test unit 1 was fifteen meters north of test unit 2, while test unit 3 was 22 meters south of test unit 2. The plowzone was removed as a single unit with subsequent deposits excavated in 5 cm levels by skim shoveling. Soil was passed through 1/4" mesh screen.

The plowzone in unit 1 (Fig. 1.6) was a light grey loam and had a high lithic density. At the bottom of the plowzone (20 cm below the surface), an orange soil, slightly clayier, was exposed. The unit was excavated from the top of this soil change to 35 cm below surface where it was abandoned because of the lack of cultural material.

Stratigraphy in test unit 2 was identical to that of unit 1, with a light brown-grey plowzone. As in test unit 1, the cultural material was very dense in the plowzone. The orange soil below the plowzone was redder and considerably clayier than that zone in unit 1 and contained very few flakes. This unit was closed at 50 cm when the lithic density had decreased to almost nothing.

Test unit 3 had a plowzone of similar characteristics to those of units 1 and 2. However, considerably more cultural material was found in the plowzone of the third unit including a biface, a point base, and bits of historic ceramics and glass.

From 20 to 25 cm a dense concentration of cultural material was present, unlike the subplowzone levels in the other units. This was immediately diagnosed as a "feature." Skim-shoveling was abandoned and the remainder of this unit (and later unit 4) was excavated with a trowel. The artifacts in this level were pedestaled and left in place until the adjacent test unit 4 had been excavated to this level. The heaviest area of concentration was in the northern part of the unit, although some hematite and fire-cracked rock were present in the southern part.

Test unit 4N (a 1 x 1 meter unit) was opened adjacent to the northern part of unit 3 on the west side when unit 3 had been excavated to 25 cm, as the material obviously extended in that direction. The plowzone was removed as one level and contained a similar amount of cultural material to unit 3 (including many flakes and a Stone Square Stemmed projectile point base).

At this point unit 4S (1 x 1 meter) was opened immediately south of 4N and west of unit 3. The lithic density in the plowzone of this unit was lighter than that of the plowzone in other units. Between 20 and 25 cm there was a

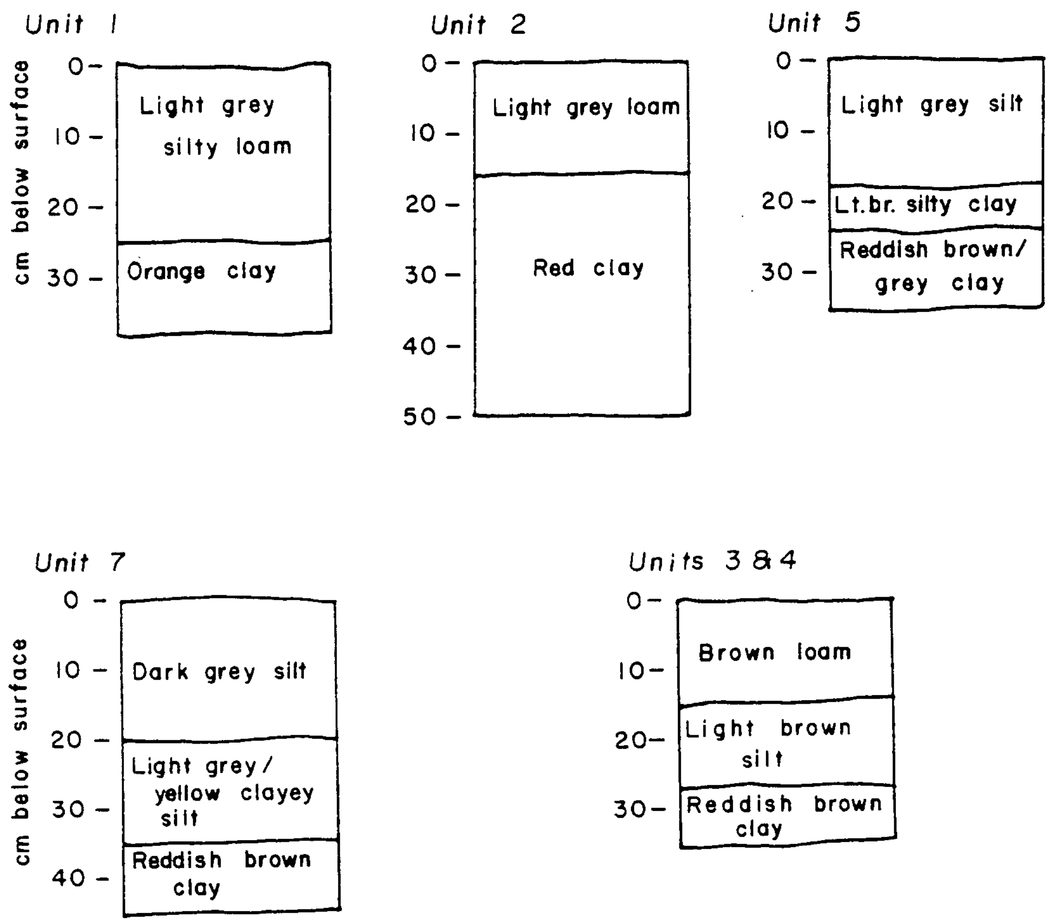


Figure 1.6. Excavation profiles — 23BE434/662.

scattering of lithics similar in density to the corresponding levels in units 3 and 4N, but mainly in the northern third of the unit. One biface was the only artifact. Tiny bits of burned earth were present in the soil. All soil in the area of the concentration of cultural material was saved for flotation.

When all three units (3, 4N, and 4S) had been excavated to 25 cm and the artifacts pedestaled, the floor was mapped and the artifacts removed. A cross-section of the depression was drawn. Unit 4S was closed, but excavation continued in the other two units by troweling. In unit 3, no more artifacts were found, debris density dropped off, and the unit was closed at 35 cm. In unit 4N from 25 to 30 cm, a piece of hematite, a core, and a biface fragment were found. Also, considerably more flakes than were found in unit 3 were present. At 30 cm, a mass of charred material was found in the "feature" area. A sample of this was taken. Excavation in this unit ended at 30 cm. A column of soil 25 x 25 centimeters, initially pedestaled in the northeast corner of the unit, was removed in five-centimeter levels and saved for lithic density analysis.

The stratigraphy in the three "feature" units was uniform, except for the lens of soil in which the concentration of cultural material was found. The plowzone was a light brown loam, with some silt and a small amount of sand. Charcoal flecks were scattered throughout. The plowzone varies in depth, extending from the surface to 13 to 17 cm below the surface. The next stratigraphic layer was a lighter brown silty soil with manganese inclusions throughout. This layer became darker until it came into distinct contact with the next layer at 25 to 30 cm. The lowest layer was a hard reddish brown clay with no more charcoal present.

The soil in which the concentration of cultural material was found was a light brown (almost tan), lightly mottled soil with manganese inclusions. It had a fine, silty texture. The highest point of this lens was approximately 20 cm below the surface, and just below the plowzone. The bottom of the lens formed a depression which at its deepest point (in unit 3) was 34 cm.

The excavations in these three units revealed a high concentration of cultural material in a discrete lens of soil and in the plowzone immediately above it. However, the original designation of this concentration as a "feature" is dubious.

Test unit 5 (1 x 2 meters) was located 30 meters southeast of test units 3 and 4, on the highest ground, in an effort to find stratified subplowzone material. The lithic density in this test unit was very light, however, and did

not extend below the plowzone. Three biface fragments, a piece of ground stone and some fire-cracked rock were found in the plowzone. Cultural material fell to almost nothing by 35 cm and excavation was terminated.

The stratigraphy in test unit 5 was similar to that of the other units at the site. The plowzone was a light grey silt 17 to 20 cm deep. The next layer was increasingly clayey with brown and grey mottling. At about 25 cm the soil was very clayey and a mottled reddish brown and grey. This soil was present through 35 cm where excavation was discontinued.

Test unit 6 (a 1 x 1 meter unit) was placed 25 meters due east of test units 3 and 4. There was very little cultural material in this unit. One projectile point (Category 303) was found at a depth of 20 cm. Very few flakes were present. Excavation ended at 28 cm. The stratigraphy in this unit was similar to that of the other units.

Test unit 7 was located west of test unit 2, in the woods, west of the fence and an abandoned road. This unit was excavated in order to determine the western extent of the site. Because of the absence of a plowzone, the unit was excavated in five-centimeter levels from the surface. Large quantities of historic artifacts were recovered from the top 40 centimeters. These artifacts included brick, glass, ceramics, nails and a human tooth. No prehistoric tools were found, but flakes were present in all levels. Flakes were sparse from the surface to about 30 cm, where they became more abundant. They tapered off to nothing at 45 cm where excavation ended.

The top level of this unit consisted of a very dark brown humus. By 35 cm it was a light yellowish brown and clay content was increasing. At this point, there was a distinct difference between the northern and southern halves of the unit. The southern part was an even yellowish brown becoming redder and clayier. The northern part had many more root and other organic stains. By 40 cm, the soil was again uniform in the unit – a reddish brown clay, similar to the soil in the orange zone in unit 1. The clay content was not as high as it was in the red and grey mottled clay of units 2 and 5. At 45 cm, where excavation stopped, the soil was an orangish brown with increasing clay content combined with silt, similar to the clay at the bottom of test unit 3. Root molds were numerous throughout the clay. A profile of the west wall was drawn.

THE COLLECTIONS

Lithic density at 23BE662 is relatively high but is mostly flake fragments, shatter, and miscellaneous rock

with a few scrapers, biface fragments (Table D-1.9) and projectile points. There is, however, the possibility of an error either in the lithics laboratory or computer laboratory that resulted in either the overlooking of some of the artifacts for analysis or computer input or data processing. There are some mystery lines in the SELGEM-generated catalog for this site. These may well represent additional artifacts. Unfortunately the discrepancy was discovered too late to be reconciled here. The fact remains, however, that the heaviest density of debris was in the plowzone and just below the plowzone in what was originally considered as a feature.

SUMMARY AND CONCLUSIONS

Site 23BE662 was originally investigated because of the presence of early projectile points on the surface. In spite of the fact that both early and late points were found on the surface, it was considered possible that the low elevation of the land surface indicated a Holocene age terrace. The excavation results suggest that the terrace deposit is most likely Pleistocene in age, possibly with thin Holocene overbank deposits containing the cultural material.

The site was undoubtedly occupied on a number of occasions over a span of perhaps 9,000 or 10,000 years. The components were apparently superimposed and could not be separated. Nevertheless, the combined occupations deposited a large amount of debris.

Site 23BE662 was inundated shortly after the June 1977 test excavations when unusually heavy rains followed by preimpoundment of reservoir waters raised the level of the South Grand River. Because of the mixing of the debris of multiple occupations, however, it is doubtful that additional useful information would repay additional work.

Site 23SR632

LOCATION AND BACKGROUND

Site 23SR632 is located on a rocky bluff top immediately east of the Osage River in St. Clair County (Fig. 1.1). The area is wooded, but the site is in a clearing around the remains of a house foundation. The area showed indication of recent use as a recreational area (remains of campfires, garbage strewn about, etc.). The site was discovered in July, 1977 during reconnaissance of the area. A projectile point with a deeply concave base postentially dating to the Early Archaic period was found on the surface, and many flakes were scattered about.

EXCAVATION AND STRATIGRAPHY

Two weeks later a crew of six returned to test the site. A datum point was arbitrarily chosen near the middle of the site, and a north-south line was extended, along which two test units were placed. The datum point was designated 0 meters south, 0 meters east. The southwest corners of test units 1 and 2 were 17 and 31 meters, respectively, south of the datum. The units were 2 x 1 meters, with their long axis running north-south. The surface at test unit 1 was fairly level, but unit 2 was located on a slope, with the southwest corner considerably lower than the rest of the unit.

Excavation was by skim-shoveling except where stated otherwise. All soil (except sample columns) was screened through 1/4 inch mesh. A 25 x 25 centimeter square was left unexcavated in the northwest corner of each of the two units to be excavated later for analysis of lithic density.

The soil changes in test unit 1 correlated fairly well with the changes in density of lithic artifacts (Fig. 1.7). The topsoil was a medium-dark grey sandy silt which became lighter in color with depth. At about 10 cm below the surface, there was an area of darker soil with some charcoal in it in the middle of the eastern part of the unit. Not enough charcoal was present for dating purposes. The stain extended to a depth of 30 cm. From then on, it became lighter in color until the soil in the unit was homogeneous tan, sandy clay at 25 cm. Gravel, meanwhile, was picking up gradually and was very dense by 25 cm. From that point on, the soil got more gravelly and clayier until the unit was closed at 45 cm below the surface.

The soil in unit 2 was similar to that of unit 1. The topsoil was a dark brown silt, which soon changed to light brown, then to tan sandy silt. When the unit was closed at 35 cm, the clay content was high and continuing to increase, and the soil was light orange in color. Gravel content also increased from the surface to where the unit was closed. This abundance of gravel greatly reduced the speed of excavation. In fact, in the final level, the shovel was abandoned, and the level was trowelled in order to keep walls vertical and the floors of levels flat.

After finishing excavation in test units 1 and 2, their north walls were profiled, the sample columns were removed in five-centimeter levels, and the units were backfilled.

When test units 1 and 2 were closed, unit 3 was opened north and slightly east of the datum, on the highest area of the site. It also was a 2 x 1 meter unit, oriented

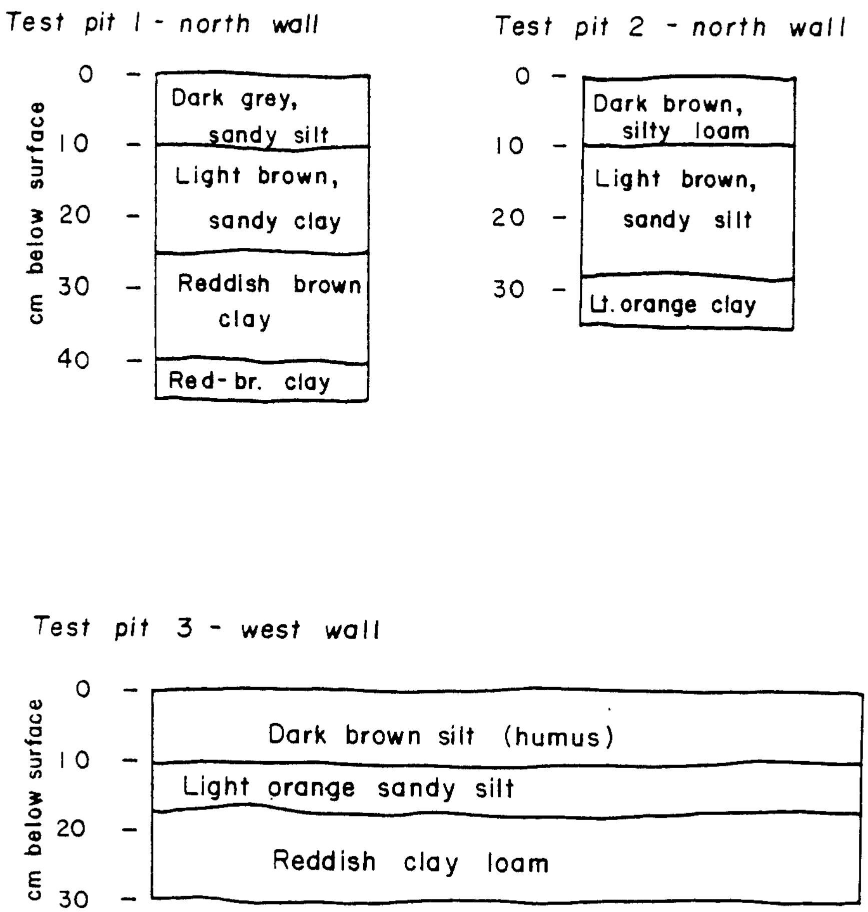


Figure 1.7. Excavation profiles — 23SR632.

north-south. The northwest corner was used as the vertical datum. The multitude of roots and gravel in the first level made it necessary to begin the excavation of the unit with a trowel, as a shovel afforded little control. A trowel was used throughout the excavation of this test unit.

The soil in this unit was very gravelly from the top, as it was in the other units at this site. The top ten centimeters were a dark brown humus full of roots and gravel. Below this layer, the soil became yellow and sandy. The dark stain with which the artifacts were associated was silty with manganese inclusions and charcoal flecks. The deepest layer excavated was a reddish clay loam.

At this point, the artifacts that were still in place were mapped and removed and the entire unit was closed. A profile was drawn of the west wall of test unit 3. The sample column was removed.

Two test units were placed contiguous with test unit 3. Since unit 3 had not been oriented to the baseline, neither were these two new units. An arbitrary point, 50 north 100 east, was located southeast of old test unit 3, and the two new units were designated 51N 99E and 52N 100E. Thus, the two 1 x 1 meter units were immediately south and immediately east of the southern half of old test unit 3.

These two units were excavated to a depth of 10 cm below the surface. In 51N 99E, a graver was found. An area of burnt soil was observed in the southwest corner. The other unit yielded a scraper and a small animal bone. At 10 cm large limestone rocks were encountered and were considered to be part of a "feature" thought to be present in unit 3. Further excavation revealed that these large rocks were crumbling bedrock. Three test holes were dug to the north and east and similar rock was found at about 15 cm below the surface in each of them. Also, the base of unit 3 (30 cm below the surface) was probed and nearly solid rock was encountered about 7 cm below the base.

Thus, it was decided to discontinue excavations. The thousands of years of occupation indicated by the presence of both Archaic concave base points and Woodland Scallorn points appeared to be compressed into 20 cm of sediment. This lack of vertical separation made determination of cultural context impossible.

THE COLLECTIONS

The excavations at 23SR632 produced a relatively large amount of debris and a high density of debris. A compilation of cataloged data (Tables D-1.10 and D-1.11) also shows that seven projectile points, ten other bifaces, forty-one

other biface fragments, fourteen scrapers, and twenty-nine cores or core fragments were also recovered, most of them from the excavations.

Six of the seven projectile points could be placed within the numbered and (sometimes) named classes described by Goldberg and Roper in Volume II. These included one Dalton variant (Category 376), one small-notched dart point (Category 368) that is similar to Plains Archaic specimens dating between 8500 and 7000 B.P., one square stemmed specimen (Category 336) that has been placed within the Late Archaic period, two Scallorn points (Category 322) that are from a Late Woodland time period, and one eared stemmed point (Category 359) whose temporal placement is still unknown. Examination of their distribution across the site suggests that temporally distinct components overlapped or were superimposed. In the absence of further diagnostic material, it is impossible to further define the contents and nature of each of the occupations.

SUMMARY AND CONCLUSIONS

Site 23SR632 is an upland site overlooking the Osage River in St. Clair County. The identification of a probably Early to Middle Archaic projectile point (the Dalton variant specimen) at the time of its initial recording suggested the presence of an early occupation in a type of location (uplands) in which very few Early to Middle Archaic occupations were known. Test excavations were accordingly placed at the site.

Although a relatively high debris density was recorded and a higher proportion than usual of projectile points, bifaces, and biface fragments was present, the identification of the projectile points makes it clear that the shallow deposits atop the bedrock contain the record of multiple superimposed occupations over a period of 9000-10,000 years.

This site, at an elevation of 720 to 730' AMSL is not inundated but is within the ten year flood pool and will be flooded when water levels are raised. Nevertheless, the compression of multiple occupations into shallow deposits suggests that little further information is to be gained from further examination of this site and, therefore, no further work is recommended.

References Cited

Allgood, Ferris P. and Ival D. Persinger
1979 Missouri general soil map and soil association descriptions. U. S. Department of Agriculture, Soil Conservation Service State Office, Columbia, Missouri.

Haynes, C. Vance
1977 Report on geochronological investigations in the Harry S. Truman Reservoir Area, Benton and Hickory Counties, Missouri. In Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. X, environmental study papers, pp. 23-32. Report to the U. S. Army Corps of Engineers, Kansas City District, American Archeology Division, University of Missouri, Columbia.

Roper, Donna C. and Michael R. Piontkowski
1977 Projectile points. In Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. V. lithic and ceramic studies. Draft report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri, Columbia.

Shay, C. Thomas
1971 The Itasca bison kill site: An ecological analysis. Minnesota Prehistoric Archaeology Series. Minnesota Historical Society, St. Paul.

Solov, Diane and Janice C. Newberry
1978 Analysis of disturbance processes at several Truman Reservoir sites. Seminar paper, University of Missouri, Columbia.

Wood, W. Raymond and Donald L. Johnson
1978 A survey of disturbance processes in archaeological site formation. In Advances in archaeological method and theory, Vol. 1, edited by Michael B. Schiffer, pp. 315-381. Academic Press, New York.

PART III

CHAPTER 2

TWO POST-HYPSITHERMAL AGE SITES, 1977 TESTS

By

Donna C. Roper

Site 23BE207

LOCATION AND BACKGROUND

Site 23BE207 was recorded during Stage 1 survey in June 1975. The site is on a terrace 500 meters northeast of the Pomme de Terre River (Fig. 2.1). This terrace is now identified as a second terrace (T-2) or Koch formation terrace of Pleistocene age, although it was not recognized as such until after the June 1977 test excavations. To the southwest, a very low terrace scarp leads down onto the more recent T-1 (T-1b or Rodgers Terrace, in fact). The surrounding trees and brush, however, serve to help obscure this geomorphic transition. There is no obvious watersource near the site, except for the Pomme de Terre. The soils on this terrace are classified within the Hartville-Ashton-Cedargap-Nolin association of Ozark stream bottoms (Allgood and Persinger 1979).

At the time of original recording, the site was in a cultivated field; consequently, the original surface collection included a variety of tools and debris. This included projectile points classified as Gary, Langtry (Standlee), Smith, Sedalia, Graham Cave, small side-notched dart (Early Archaic), unidentified straight-stemmed, and unidentified corner-notched. Knowing what we now know about river-terraces and about sites such as 23BE207, we probably would not now attempt substantial investigations beyond recording, surface collection, and probably monitoring. However, this was one of the first sites investigated in 1977 and helped contribute to our understanding of where subplowzone deposits were likely and where excavations were likely to be futile.

EXCAVATIONS AND STRATIGRAPHY

A total of seven 1 x 1 meter test pits were excavated at this large site. In all excavations, the plowzone was removed as a single unit and subplowzone excavations

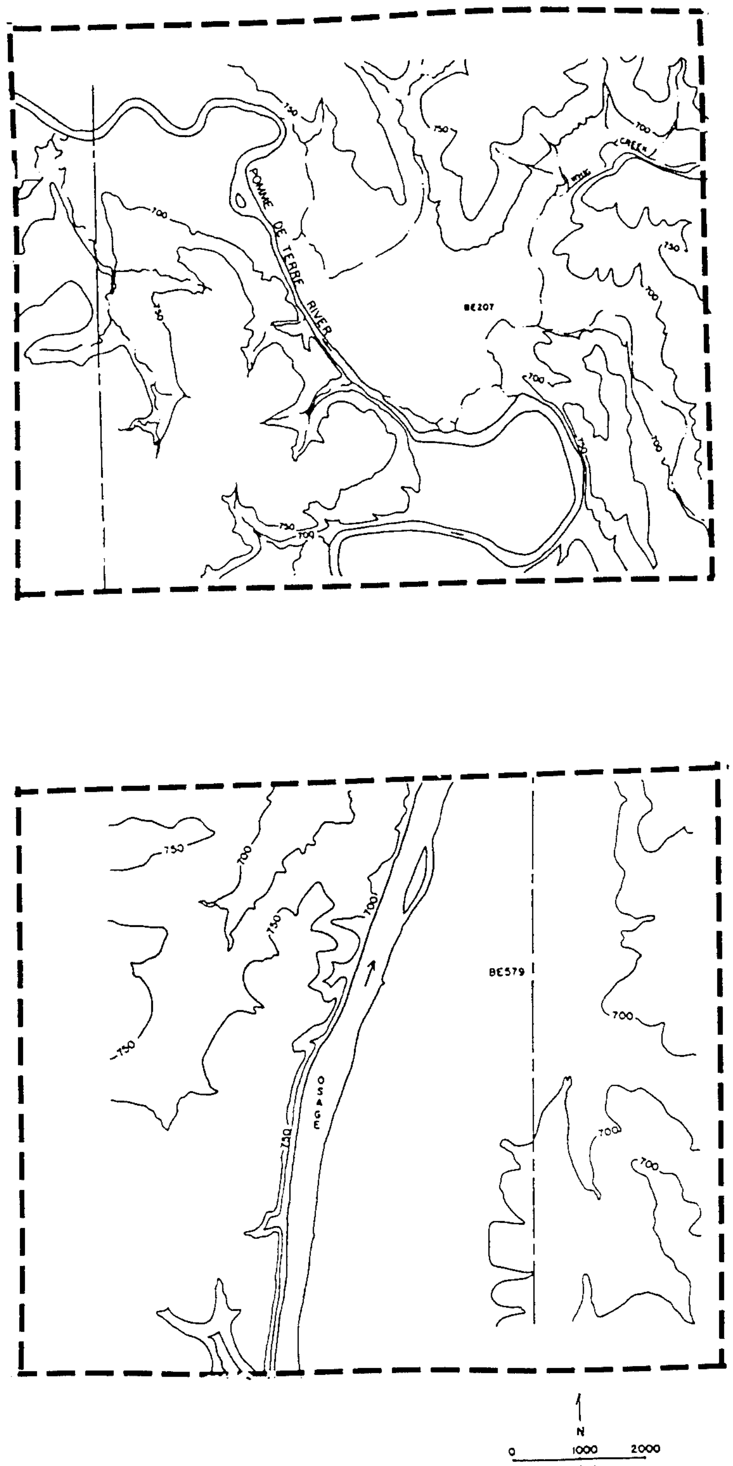


Figure 2.1. General location maps.

proceeded in 10 cm arbitrary levels from the base of the plowzone. All soil was passed through 1/4" mesh screen.

The plowzone in all squares was brown in color and loamy in texture. Debris density was never high. The subplowzone deposits were generally described as light brown or light grey and were an extremely tough clay. Mottling of rust and manganese concretions was apparent. Debris density in subplowzone deposits was extremely low and was usually confined to the top of the 0-10 cm below plowzone level. No square was excavated beyond 10 cm below the plowzone.

THE COLLECTIONS

The collections from 23BE207 are relatively small. As with many sites, the collection is largely comprised of flake fragments, shatter, and miscellaneous rock (Table D-2.1). Projectile points, biface fragments in some quantity, and a variety of scrapers were, however, recovered from the surface of the site (Table D-2.2). Identified projectile points include a Rice Lobed, two Etley points, a Rice-Side Notched, a Cooper point, a concave based probably Woodland dart, an unclassified arrowpoint, a small corner-notched point whose temporal affiliation is unknown, an unidentified corner-notched point, and a specimen too badly broken to identify. This aggregate of points indicates that 23BE207 was the locus of repeated occupations from the Early Archaic through Late Woodland periods.

CONCLUSIONS AND RECOMMENDATIONS

The test excavations at 23BE207 reveal that the multiple occupations occurred on a land surface that had been formed and stabilized prior to the earliest occupation. Criteria for recognition of terraces were uncertain at the time; it now seems, however, that the sediments at this site are representative of the T-2 which is Pleistocene in age.

Because the site contains a mixed occupation with no depth, it is unlikely that further investigations would reveal additional information. The site is now inundated, but even had that not occurred, no further work would have been recommended.

Site 23BE579

LOCATION AND BACKGROUND

Unnamed site 23BE579 is one of a series of sites surrounding a marshy area on the right bank of the Osage River as it flows north out of the east side of the large meander

loop known locally as Peal Bend (Fig. 2.1). The river here flows at the base of the bluff which is on the left side of its valley, leaving a broad expanse of bottoms on the right, or east bank. A narrow T-0, a broader T-1, and a ridge remnant of T-2 comprise the bottoms in this area. The T-2 remnant extends in a roughly north-south direction, dropping off at its north end into a backwater lake, probably the remnant of an old river channel. To the south is a spring, probably the same one identified by Mehl (1962: 93) as Missouri Pleistocene Vertebrate Locality MSGQV 1006. Mehl (1962: 93) notes concerning this locality that

> It was reported by S. H. Whipple in 1843. Elephant, mastodon, musk-ox, peccary, and deer have been reported ....

More recent paleontological investigations have been carried out by Saunders (1977: 10-15) as part of the archeological and paleontological investigations in the Truman Reservoir area.

The spring itself is ringed with prehistoric debris. The distribution is not continuous, however, and Archaeological Survey of Missouri site numbers 23BE576, 23BE577, 23BE578, and 23BE579 all apply to sites surrounding the spring. All were originally recorded on 14 July 1976 during the Stage 2 survey. At the time of the original survey, 11 projectile points, including one Etley, one Langtry or Standlee, one Sedalia, and eight unidentified points were collected from the surface of 23BE579.

EXCAVATION AND STRATIGRAPHY

Site 23BE579 was one of the first sites revisited by one of the crews in the summer of 1977. Whereas parts of the bottoms had recently been disked and were being prepared for planting in soybeans, the 23BE579 area had not been disked and presented good conditions for surface examination. It was decided to use controlled pickup techniques on a portion of the site to sample the kind, quantity, and distribution of the debris on the ridge. Three transects, six meters wide and 25 meters apart were run east-west starting at the south end of the ridge. Additional transects would have been collected had the field not been disked and planted about this time. Collections were accomplished in 2 meter square units.

Two test pits, one 1 x 1 and one 2 x 2, were also excavated. The plow zone in each pit was removed as a single unit, and excavations proceeded in 10 cm levels below this. All matrix was passed through 1/4" mesh screen.

Test pit 1 was 1 meter square and was placed 10 m to the south of the baseline for surface collection in transect 2, between transects 1 and 2. The plowzone in this square was 24 cm deep and very distinct from the subplowzone deposits. Debris density in the plowzone was relatively high. The plowzone soil is dark brown, the subplowzone was a yellow-brown tight clay. A negligible amount of debris occurred below the plowzone.

Test pit 2 was placed in square 2N32E of transect 3. Impressions during the surface collection suggested that debris density here was unusually high. Test pit #2 was 2x2 meters in size, and like test pit 1, the plowzone was excavated as a single level, with 10 cm levels to be excavated below the plowzone if debris were found. The natural stratigraphy was identical to that in test pit 1, and like test pit 1, the plowzone contained a high debris density with little debris in the subplowzone levels.

SURFACE COLLECTION

The surface collection of three transects was completed before the site area was plowed and disked, therefore obscuring the surface distribution. The transects were placed perpendicularly to the long axis of the terrace remnant (in other words, they ran east-west) and were of a length that would cross the width of the observed area of scatter. Transect 1, the southernmost transect, was therefore 40 meters long, transect 2 was 48 meters long, and transect 3 was 50 meters long. A total of 207 2 x 2 meter squares were therefore collected.

The primary objective in the analysis of these materials was to be the examination of surface distributions to look for possible "activity areas" or concentrations of material. Gross classes of debris were therefore used. All surface material was divided into four general categories: artifacts or tools – all bifacial and unifacial tools, including retouched flakes; flakes – all unmodified flakes, including both whole flakes and flake fragments; shatter; and unmodified rock. Listings of these data are given in Table D-2.3.

An analysis of distributions of materials using spatial analysis techniques was not particularly productive of insight concerning the surface distributions. Flakes, shatter and unmodified rock are definitely clustered on the surface of the site but except for one small concentration in the middle of transect 3, tools show a largely random-appearing distribution. Test Pit 2 was placed in this concentration.

THE COLLECTIONS

Two test squares were placed to determine the depth of the deposits (which at that time were thought to be on a T-1b) and to recover a sample of debris for analysis. The deposits, of course, proved to have no depth below the plowzone. Debris densities were high within the plowzone. However, much of the material was flake fragments, miscellaneous rock, and shatter (Table D-2.3), the latter of which appeared in very large quantity in the 2x2 meter Test Pit 2. Tools were confined to six biface fragments and one irregular side scraper.

Seven projectile points were collected either during the intensive surface collection or from between the surface collection transects. These include a Rice Lobed (Category 354), two Afton points (Categories 312 and 316), one Cooper variant (Category 311), one Standlee (Category 332), and two points too badly damaged to be identified (Category 999). This collection, along with the surface collection from the original 1976 survey, suggests multiple occupations during Early Archaic, Late Archaic and Woodland times.

CONCLUSIONS AND RECOMMENDATIONS

Site 23BE579 is clearly a multicomponent site, used on a number of occasions during a period of perhaps 8000-9000 years. These occupations, however, all occurred on a land surface already old when first occupied and thus are all contained within the plow zone. Material is not randomly distributed on the surface, but the form of distribution may as easily be due to dispersal subsequent to deposition as to cultural deposition.

Springs have often been foci of cultural activity and the spring near 23BE579 seems to be a clear instance. Archeological remains surround the spring, although field conditions were never very good for observing the form of the distributions. However, the continuity of material along a north-south trending terrace remnant extending away from the spring suggests that the occupation may not have been oriented toward the spring.

While 23BE579 itself was not inundated until later, the flooding of the lower terrain made the site inaccessible by late summer 1977. Had this not happened, it might have been fruitful to obtain further controlled surface collections at this and other nearby sites. Analysis would have then been oriented toward attempting to separate discrete occupations. The surface collection that was accomplished contains some suggestions that this may have been possible;

it also contains suggestions that it may not have. The effects of inundation upon surface distributions are presently unknown, but we have posited elsewhere in this report that they are probably highly destructive. Some information has therefore probably been lost in this area. The water level over the sites is in excess of 8 meters placing the site within the transitional zone of the reservoir during most of the year and in the static zone during the remainder of the year (Garrison 1975: 282). Inundation effects here will be less severe than in the upper, active zone of the reservoir; however, Garrison (1975: 286) suggests that "sites with little stratigraphic depth should suffer extreme displacement and total loss of levels due to current action." If drawdown ever exposes this area, brief examination may be recommended, but it likely will prove unproductive.

References Cited

Allgood, Ferris P. and Ival D. Persinger
1979 Missouri general soil map and soil association descriptions. U. S. Department of Agriculture, Soil Conservation Service State Office, Columbia, Missouri.

Garrison, Ervan G.
1975 A qualitative model for inundation studies in archeological research and resource conservation: an example from Arkansas. Plains Anthropologist 20(70): 279-296.

Mehl, Maurice G.
1962 Missouri's ice age mammals. Educational Series 1. State of Missouri, Department of Business and Administration, Division of Geological Survey and Water Resources, Rolla.

Price, T. Douglas
1978 The spatial analysis of lithic artifact distribution and association on prehistoric occupation floors. In Lithics and subsistence: the analysis of stone tool use in prehistoric economies, edited by Dave D. Davis, pp. 1-33. Vanderbilt University Publications in Anthropology 20.

Saunders, Jeffrey J.
1977 Paleontological resources survey, Tebo, South Grand and Osage arms. Harry S. Truman Dam and Reservoir, Osage River Basin, Missouri. Report to the U. S. Army Corps of Engineers, Kansas City District. Illinois State Museum.

Whallon, Robert, Jr.
1973 Spatial analysis of occupation floors I: application of dimensional analysis of variance. American Antiquity 38(3): 266-278.

PART III

CHAPTER 3

THE 1977 TEST EXCAVATIONS AT TEMPORALLY UNKNOWN SITES

by

Susan K. Goldberg

23BE304 — WILD MAN POTATO SITE

Location and Background

The Wild Man Potato Site, 23BE304, was identified in June 1975 during Stage 1 of the Cultural Resources Survey. Located in Alexander Township in Benton County, the site is 2.5 kilometers southeast of Hogles Creek School. At 660' to 680' MSL, it is situated on the T-1b and floodplain of the right bank of Hogles Creek. The site is at the base of a northeast facing bluff, almost .35 kilometers from the creek. The floodplain here is extremely wide and is part of the expansive bottomlands along the Osage River in Peal Bend; the confluence of Hogles Creek and the Osage River is only 1.3 kilometers from 23BE304 (Fig. 3.1).

Soils in the general area are classified in the Hartville-Ashton-Cedargap-Nolin association of the Ozark bottomlands (Allgood and Persinger 1979). The soil at the site is extremely cherty due to its bluff-base location. The chert from outcrops near the site was not specifically identified, but the majority of readily available chert in the area is Jefferson City, with smaller amounts of Burlington and Chouteau (Ray, Vol. II).

In 1975, during the original survey of 23BE304, although ground cover was minimal (0-10%) in the fallow field and rainfall had been heavy, the only cultural material recovered was debitage. When the site was resurveyed in May 1977, the field conditions were similar, but three projectile point fragments were found. During the first stage of the mitigation program each site which was previously unassignable to a temporal period, but yielded diagnostic material, would be tested to determine sub-surface extent of the deposits. This site, being one of the first to be reexamined, was tested by means of controlled excavation squares rather than simple shovel tests.

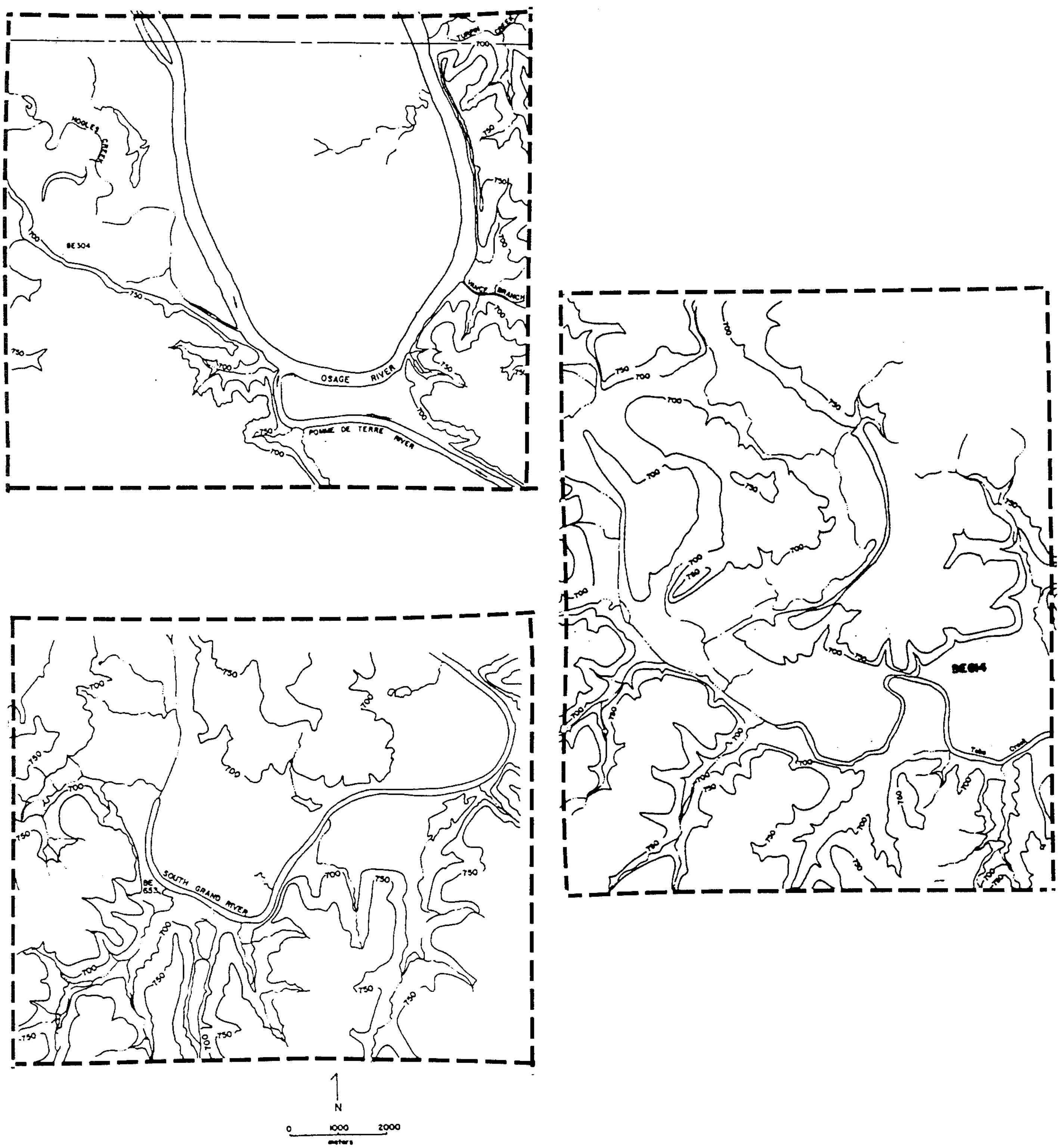


Figure 3.1. General location maps.

Excavations

In order to select the placement of the test units and determine the surface limits of the site, the field was systematically walked. Passes were made across the site, in an east-west direction, parallel to the terrace edge, with surveyors spaced at five meter intervals. The first and last piece of cultural material in each transect was flagged, and all tools and debris were counted. The resultant limits of the site are shown in Fig. 3.2. Based on the artifact (i.e., tool and debris) counts, three test units were placed on the site (Fig. 3.2). Test Pit #1 (S8, WO) and Pit #3 (S73, WO) were located in the two areas of heaviest lithic concentration. Test Pit #2 (S23, WO) was placed between the other two in an area of extremely low debris density. Low density coincided with the crest of the terrace, perhaps indicating that the archeological component was partially buried.

The plow zone in each square was removed by skim-shoveling and was passed through 1/4" mesh screen. This level and all succeeding levels were excavated as arbitrary 10 cm thick units, measured down from the base of the plow zone in each corner. Pit #1, a 1x1 meter square, was excavated to a depth of 10 cm below the plow zone. No material was recovered from this level which was trowelled and not screened due to a high content of wet clay. Pit #2, a 1x2 meter unit, was terminated at 40 cm below plow zone – a depth where cultural material was not present. All levels in Pit #2 were screened. Pit #3, a 1x1 meter square was excavated only to 10 cm below plow zone. That level was trowelled but not screened. Following excavation each unit was profiled (east and north walls) and then backfilled.

Stratigraphy

The soil on the terrace appeared to be consistently compact, silty clay, with yellowish-brown color, and darker brown mottles from the base of the plow zone to 40 cm below the plow zone. Both Pits #2 and 3 contained this soil below a loose dark brown plow zone (Fig. 3.3). Square 1, which was on the slope of the T-1b terrace, seemed to be in a more recent alluvium with soil below the plow zone having a higher clay content and a lighter brown color (Fig. 3.3).

As evidenced from tool and debris densities in each excavated level in all three squares (Table 3.1), the original occupation may have been confined to the crest of the T-1b terrace. Cultural material in Pit 1 is confined to the plow zone and probably represents redeposited material from the site. This material may have been washed down slope and incorporated in more recent alluvial soils, or may be the result of recent redeposition during plowing. A

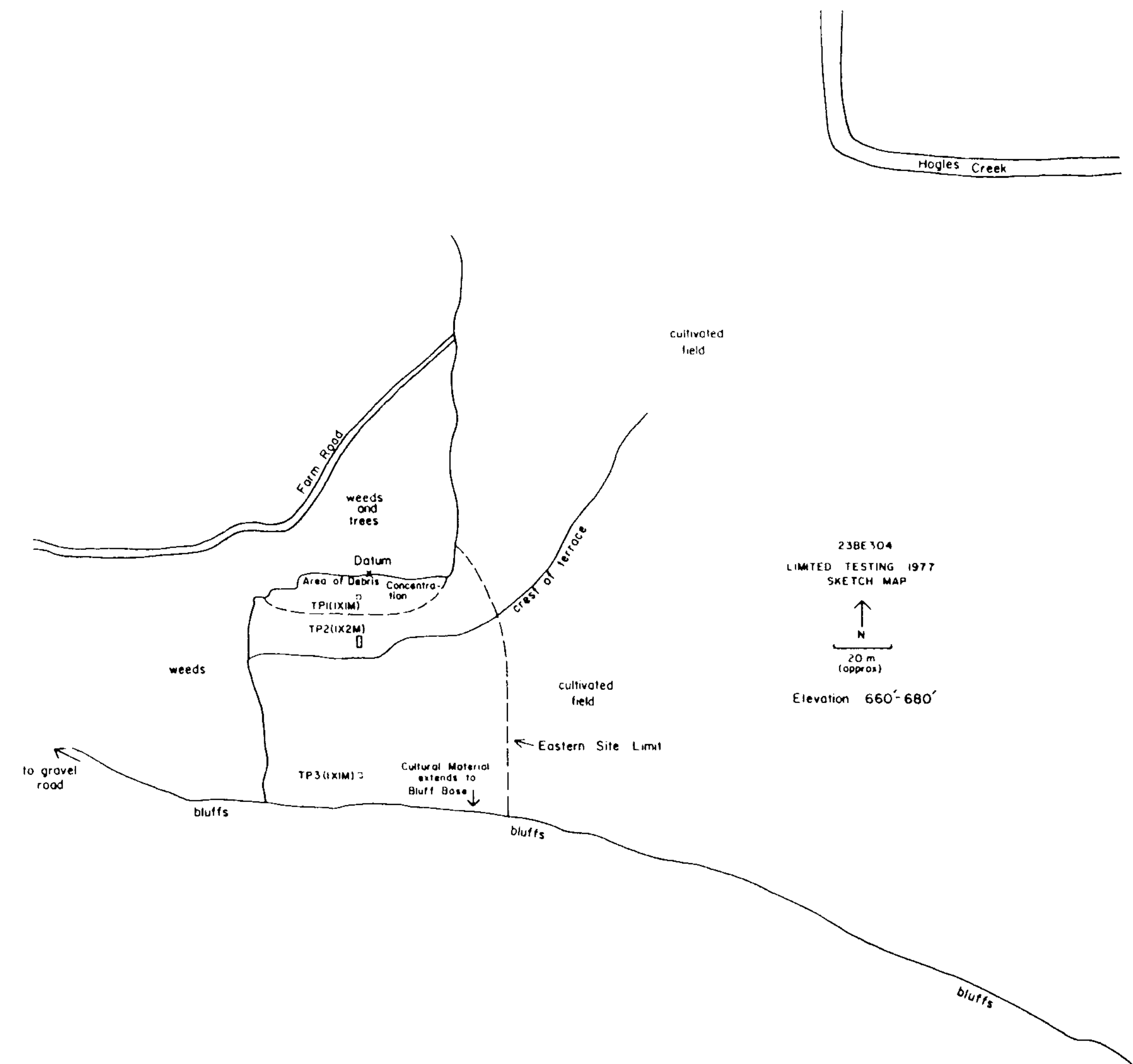


Figure 3.2. 23BE304 site sketch map.

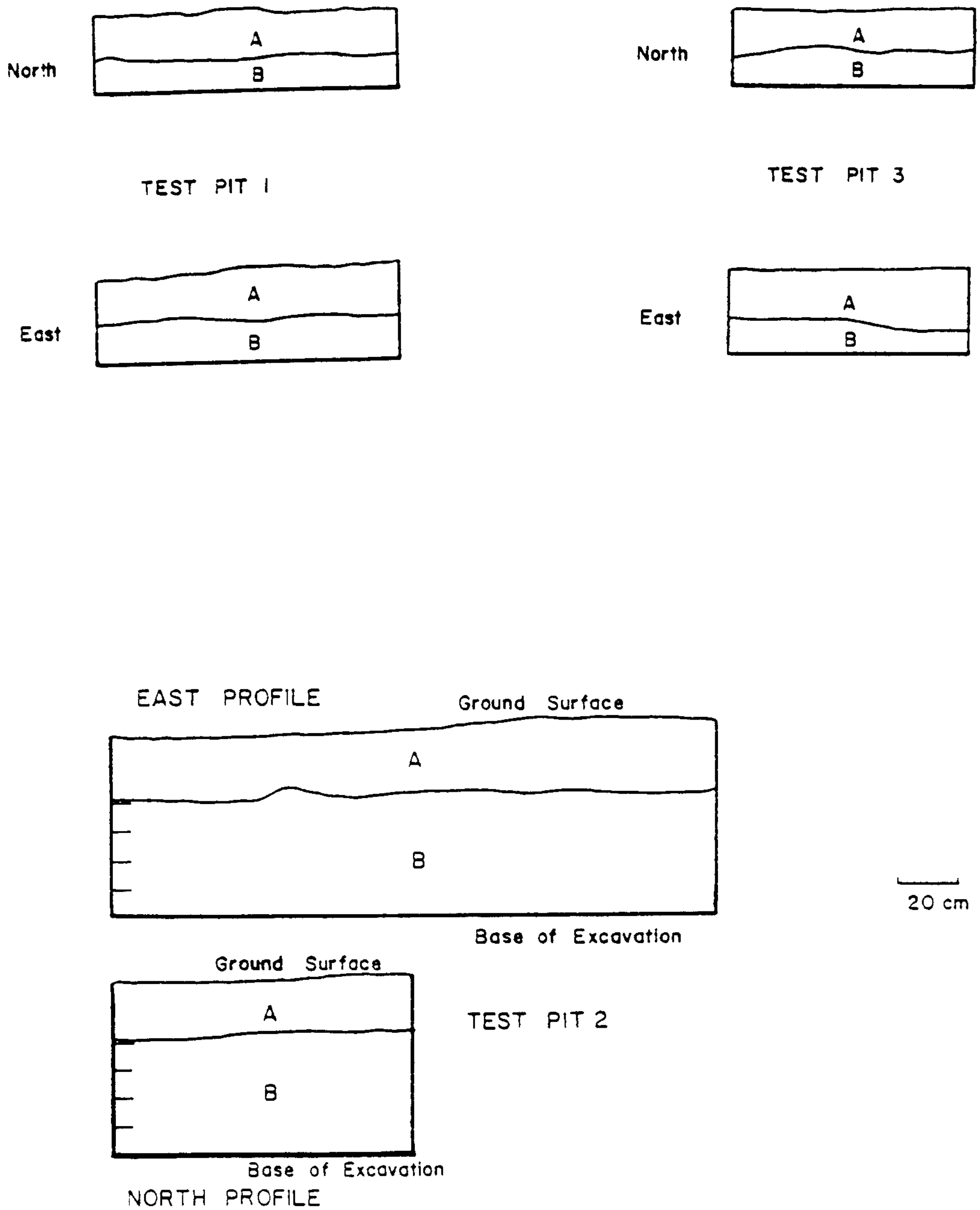


Figure 3.3. Profile of test pits at 23BE304. Test pit 1-Stratum A: plow zone, loose dark brown with moderate clay content. Stratum B: medium, reddish-brown, high clay content, no cultural material. Test pits 2 and 3-Stratum A: plow zone loose very dark brown. Stratum B: compacted, silty, medium brown.

similar pattern of stratigraphic placement of cultural material is seen in Pit 3, closest to the bluff base. There, cultural material is largely confined to the plow zone (Table D-3.1) and again may be the result of modern cultivation practices.

Pit 2, then, is probably the only one which cross-cuts the site's original deposits. In that square, on the crest of the terrace, there is a continuous distribution of cultural debris from the surface to a depth of nearly 40 cm below the plow zone. Flakes, flake fragments, and shatter were recovered from all five excavation levels. Well made tools were found only in the upper two levels; a biface fragment and a straight unifacial side-scraper were in the plow zone and a knife fragment was in the 0-10 cm level. Historic debris, including a nail, pottery, and glass, was mixed with the aboriginal materials. The presence of a piece of glass at a depth of almost 30 cm below the plow zone indicates that the integrity of the prehistoric deposits has been highly disturbed.

The Collections

The collection of materials from 23BE304 is extremely small. Tools include the three from Pit 2 and six others from the surface (Table D-3.1). In addition to the four biface fragments and one knife, three bifacially worked tools from the surface can be classified as projectile points. One of these is too fragmentary to classify, but the others appear to be from the Late Archaic period — an Etley and a Table Rock Stemmed. The only unifacially worked tool is the straight side-scraper from Pit 2.

Of the 161 flakes recovered at the site, only 26 are complete. Only four of those were modified; those four were from the surface. All of the 26 complete and unmodified flakes were tertiary flakes. There were 132 pieces of shatter and one chert chunk recovered; some may have been deposited naturally from the nearby bluff.

The only chert identifications made on materials from the site were on eight of the tools. While the sample is too small to be significant, the distribution of six pieces of Jefferson City and one each of Chouteau and Indeterminate Ordovician seems representative of the cherts occurring naturally in the area.

Summary and Conclusions

It is difficult to assess both the temporal and functional placement of 23BE304 on the basis of these limited tests and the small number of artifacts recovered. However, a few tentative conclusions about the site can be made;

mostly drawn from negative evidence, they are necessarily open to revision. The only two projectile points complete enough for identification indicate that the site was occupied during the Late Archaic period. The continuous debris density throughout the depth of the deposits and these points suggest that the site was used during a limited period.

A determination of the site's function can be made, but primarily on the basis of negative evidence. There is little diversity in both the tool and debris assemblages. With the exception of one scraper, all the tools were bifaces, perhaps limited to knives and projectiles. Furthermore, nearly all of the flakes were tertiary representing the final stage of lithic reduction. Given the small site size (approximately 5600 m^2), the low debris and tool density, and this extremely small tool diversity, 23BE304 was probably a limited activity area – perhaps for resource extraction.

The limited testing at the site shows that its integrity has been at least disturbed, if not totally destroyed. The one area which possesses depth of cultural deposits – the top of the terrace – has been disturbed historically. Furthermore, there appears to be no preservation of faunal or botanical remains or of activity features and structures. No further testing appears warranted at the site.

23BE614

Location and Background

Site 23BE614 was originally identified in August, 1976 during the Stage 2 transect survey. It is located in the Lindsay Township, Benton County, approximately 2.3 kilometers north-northeast of the Racket School. At an elevation of 660' to 680' MSL, it is situated on a small rise in the floodplain of Tebo Creek. Immediately adjacent to a small backwater slough, the site is only 100 meters north of the creek (Fig. 3.1). The soils in the general area are classified in the Hartville-Ashton-Cedargap-Nolin association of Ozark bottomland soils (Allgood and Persinger 1979). Available chert in the area as described by Ray (Vol. II) from a collection area surrounding 23BE660, a few kilometers away, consists primarily of Jefferson City cherts, with smaller amounts of Chouteau and Burlington cherts.

In 1976, when the field was planted in beans with 10-50% ground cover and after light rainfall, debris density at 23BE614 was light and the total site scatter was only 25 square meters. A single Scallorn arrow point and all debris from the surface were collected at that time. Chosen from

the sample of post-Hypsithermal sites from the reservoir's lower elevations, the site was resurveyed in May, 1977. During the resurvey the field was fallow and there had been light rainfall; surface visibility was better than during the original survey. The site was systematically walked in an attempt to recover additional diagnostic material and to determine the site limits. No further projectile points were recovered from the exact location previously recorded as 23BE614. However, an additional concentration of debris was noted on the same floodplain rise, separated from the original scatter by an erosional gully. The site limits were extended eastward to include this scatter, thus increasing the site size to approximately 2000 square meters (see Fig. 3.4). A Standlee point was recovered from the eastern area of the site. Both areas had low debris density.

This being one of the first post-Hypsithermal sites to be tested in 1977, controlled excavations rather than shovel testing were performed. The goal of these excavations was to determine the sub-surface parameters of the deposits – depth, density, and preservation of site structure and material remains.

Excavations

No real concentrations of debris were noted on the site, so two 1x1 meter squares were placed to sample the micro-terrain of the area. Pit #1 (20S, OW) was placed on the slope of the small rise. Pit #2 (40S, OW) was put on the crest of the floodplain ridge (Fig. 3.4).

The plow zone in each square was removed as a single level. Levels below this were excavated in 10 centimeter units, following the slope of the original ground surface. All levels were skim-shoveled and the matrix was passed through a 1/4" mesh screen. Pit #1 was excavated to a depth of 30 cm below the plow zone. Five levels were excavated below the plow zone in Pit #2, to a depth of 70 cm. Cultural material persisted in the final levels in both squares with the low density of previous levels. Excavation was terminated because the farmer was waiting to plant the field. Both squares were profiled and back-filled.

Stratigraphy

There was some difference in the natural stratigraphy between the two areas of the site. On the crest of the terrace, in Pit 2, there appeared to be two soil zones below the plow zone. From approximately 20 cm to 50 cm below ground surface there was a unit of dark brown soil with lighter brown mottles (Fig. 3.5). This zone contained some clay, with the clay content increasing with depth. Below

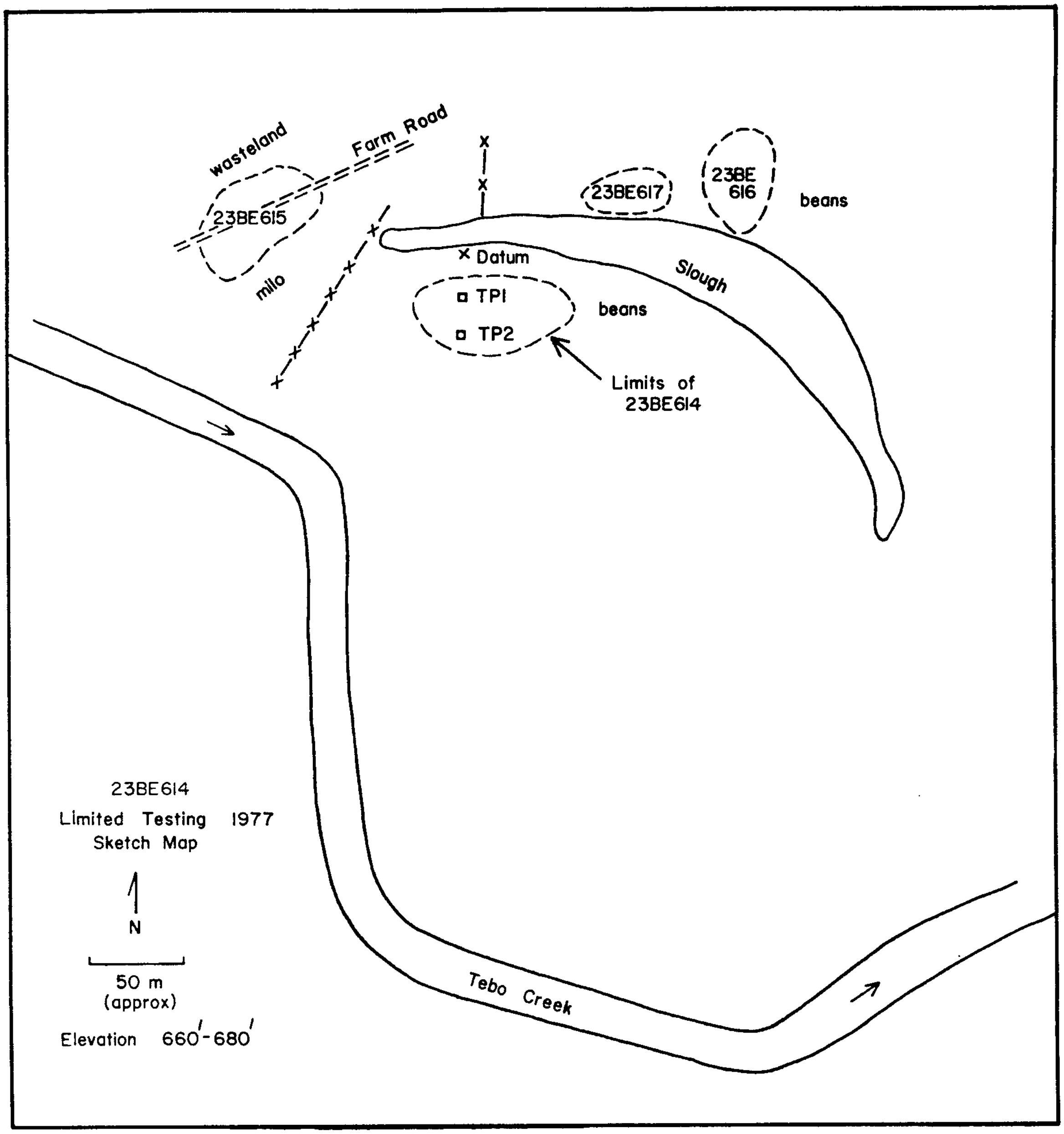


Figure 3.4. 23BE614 site sketch map.

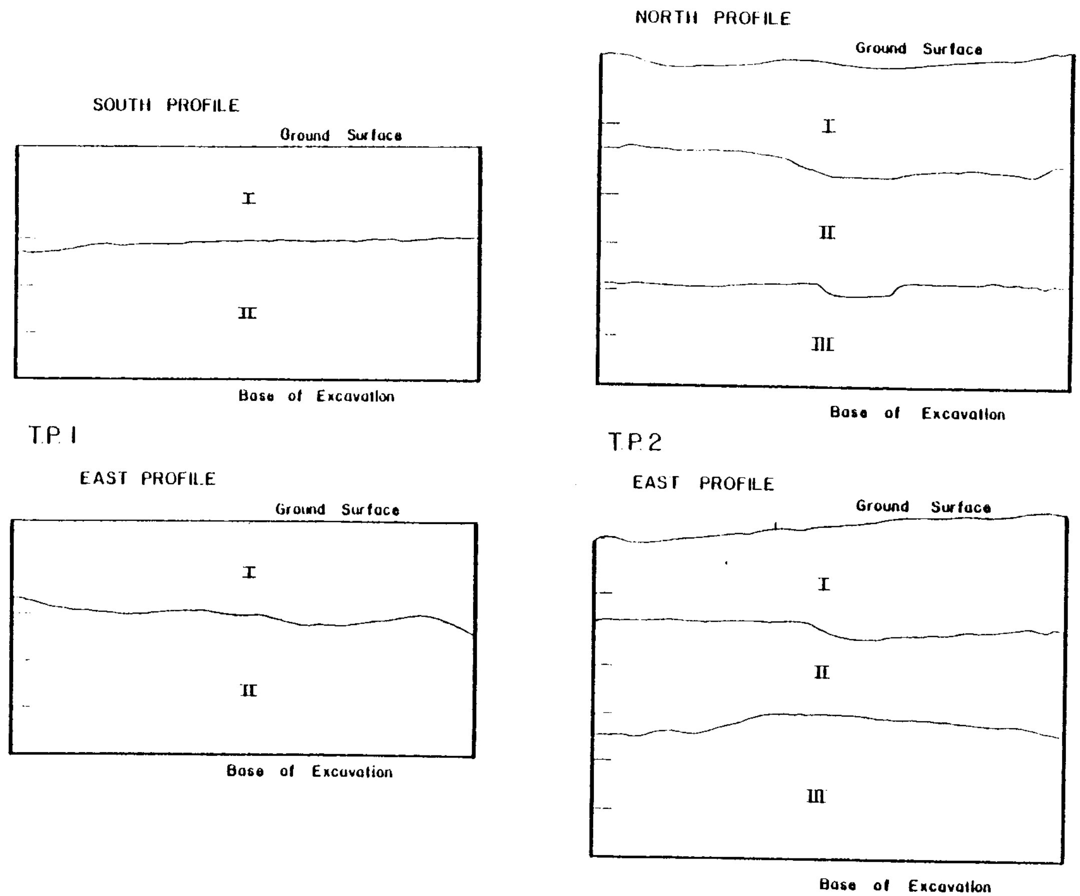


Figure 3.5. Profiles of test pits 23BE614. Stratum I: plow zone, loose dark brown; Stratum II: dark brown, compact, moderate clay content; Stratum III: yellowish clay with dark yellowish-brown mottles, extremely compact.

the dark soil, from 50 cm to 70 cm was a zone of yellowish-brown soil, extremely rich in clay content. Cultural material was found in both soil units, but was densest in the plow zone and the deepest soil zone (Table D-3.2).

Pit 1, which was lower than Pit 2 and on the terrace slope contained only one soil unit below the plow zone (Fig. 3.5). This unit was identical to the lower yellowish-brown clayey unit of Pit 2. In Pit 1 there was no discontinuity in the distribution of cultural material from the plow zone to 30 cm below the plow zone (Table D-3.2). The difference in the soil between the two areas may be explained by differential leaching and drying. Pit 1, on the terrace slope, is lower and closer to the backwater slough, and thus may be in a poorly drained area. The difference in soil matrix in the two squares does not appear to be explained by prehistoric cultural activity (i.e., formation of a midden).

Collections

The amount of debris and tools recovered from the site is extremely small (Table D-3.2). Only four well-made tools were recovered; two of those were projectile points from the surface. The other two were bifaces from the upper two levels of Pit 1. Only two modified flakes were found and neither was from below the plow zone.

The other remains from 23BE614 can be classed as debris. The largest percentage of the debris was in the form of broken flakes. These flakes were size graded (Table D-3.2) and over half are smaller than 1.5 cm^2. Nine flakes were secondary and the rest were tertiary. Only two complete flakes were recovered. Additionally, 30 unmodified chunks, 46 pieces of miscellaneous rock, and 51 pieces of shatter were found. Historic material consists of 6 cinders from the lowest level of Pit 1.

Chert identification of most of the debris was impossible due to its small size. The identifiable tool and debris specimens were distributed as follows: Jefferson City - 19; Burlington - 10; Chouteau - 8; Indeterminate Ordovician - 3; and Indeterminate Mississippian - 4.

Summary and Conclusions

Based on the information gained from the limited investigations at BE614, it is difficult to draw conclusions about the site's function and temporal placement. Historic activity has disturbed the deposits in the lower part of the site as evidenced from the historic cinders 30 cm below the plow zone in Pit 1. Pit 2, on the crest of the terrace may contain intact deposits, but only lithic debris – no tools – was recovered there. Additionally, the density of cultural

material in both areas was extremely low. The limited diversity of tool types – all bifaces – may indicate that the site was used for limited activities. The small site size may lend additional support to such a conclusion.

No radiometrically datable material was recovered, so temporal placement is based solely on the two projectile points recovered from the surface. The site was used at least during the Late Woodland period as evidenced by a Scallorn arrow point. The Standlee point may indicate that the site was occupied some time earlier than this. The debris distribution in Square 2 (Table D-3.2) with a sterile level at 20-30 cm and an increased debris density between 30 cm and 50 cm may also be evidence that the site was used at more than one time.

Given the fact that the lower portion of the site had been disturbed historically, intensive investigations at 23BE614 do not seem warranted. Additionally, the site's low debris density, lack of preservation, and particularly its small number of tools indicate that further work here would do little to enhance our knowledge of the chronology of the area.

23BE653 – COOTIE WEST SITE

Location and Background

The Cootie West Site was identified in September, 1976 directly outside of a transect surveyed during Stage 2 of the Cultural Resources Survey. It is located in Tom Township in Benton County approximately 0.5 kilometers west-northwest of the old Long Shoal Bridge over the South Grand River. The site is near the confluence of an intermittent stream and the South Grand River – approximately 70 meters southwest of the river. At an elevation of between 660' and 680' MSL, 23BE653 is on a T-1b terrace very near the base of an east-facing bluff (see Figure 3.6). There are several other sites in the area, including the Cootie Site, 23BE676, an extensively excavated site, .3 kilometers to the southeast. Soil in the general area are classified in the Hartville-Ashton-Cedargap-Nolin association of Ozark bottomland soils (Allgood and Persinger 1979). Chert availability, as described for an area 1 kilometer in radius around 23BE676, is of the following percentages: Jefferson City - 75%; Burlington - 15%; and Chouteau - 10%.

At the time of the initial survey of the site, ground cover in the wasteland/pasture was almost 100%. Collection was confined mainly to exposed eroded areas. Site limits could not be determined as visibility was poor and shovel

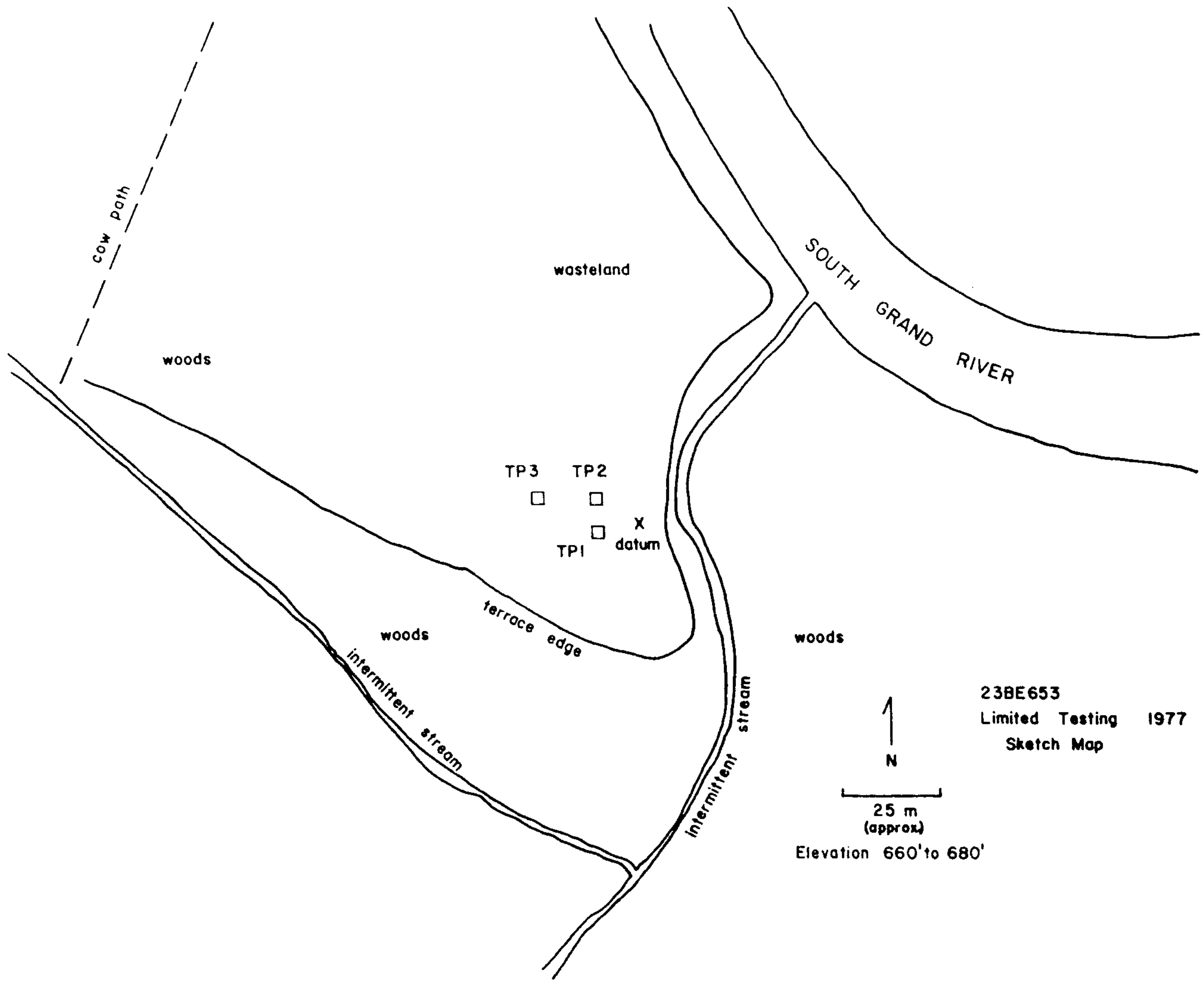


Figure 3.6. 23BE653 site sketch map.

testing was not employed due to dry, compact ground. Only debitage and cores – no diagnostic materials – were recovered, and those mainly from the southwest area of the site. It was noted, then, that the site may have been buried in the higher ground on the northern portion of the site.

In 1977, 23BE653 was chosen as part of a 25% sample of sites of unknown temporal affiliation which would be resurveyed and shovel tested. In May, 1977, the ground conditions were similar to those in 1976 during the original survey; ground cover was nearly 100%, except on the south facing slope of the eroded terrace. However, there had been some rainfall so shovel testing was possible. These sub-surface probes revealed that debris density was high, particularly on the crest of the terrace, and the potential for preservation was high; chunks of charcoal were recovered.

Although, even after resurvey and shovel testing, no diagnostic materials had been collected from the site, we decided to do further testing. Given the site's high debris and tool density and the potential for preservation of site structure (material recovered from at least 50 cm in undisturbed context), it was hoped that further information, including diagnostic materials, could be recovered from more extensive tests.

Excavation

Three 1x1 meter squares were placed on the site in the area with the highest debris density, as determined by shovel testing. Pit #1 was on the southern slope of the terrace. Pit #2 was placed six meters to the north, on the crest of the terrace. Pit #3, also on the terrace crest, was ten meters to the west of Pit #2 (Fig. 3.6).

Since no plow zone was apparent (the area seemed to have been in pasture for many years), each square was excavated from the ground surface in arbitrary 10 centimeter levels. All levels were shovel scraped and passed through 1/4" mesh screen. All tools found _in situ_ were piece plotted. Seven levels were excavated in Pit #1, three in Pit #2, and six levels in Pit #3. All squares were terminated when debris density had significantly decreased and the matrix was nearly sterile. All pits were profiled following excavation.

Natural Stratigraphy

The soil deposition and formation processes appear to be somewhat different across the site and are dependent upon location in relation to the terrace. Test pits 2 and 3, which were placed on the crest of the ridge have similar profiles. The upper 10 to 15 cm in both squares consists of a

loose dark brown silty loam (Fig. 3.7). This zone appears to be highly disturbed through a combination of either clearing or cultivation and bioturbation. Below this soil, to a depth of approximately 35 cm, there is a zone that is lighter brown with a higher clay content. In test pit 3, which was excavated below that depth, there is a zone of very compact clayey soil, blocky in structure and containing grey and dark brown mottles – probably Rodgers alluvium. Cultural material in both squares was concentrated in the upper two zones, but was still present in the Rodgers alluvium.

Test pit 1, which was on the southwest facing slope of the terrace, contained similar strata, but in a somewhat different configuration (Fig. 3.8). The upper stratum, consisting of loose dark brown, silty loam, reached a depth of 30 cm. Below this, to the base of the excavations at 60 cm, was a zone identical to that on the crest of the terrace – clayey, light brown soil.

The difference in thickness of the zones in the two areas of the site may be explained by processes of terrace formation and sedimentation. The terrace is a T-1b, consisting of Rodgers alluvium (Stratum C), with overbank material forming Stratum B. Stratum A appears to be a zone of fairly recent disturbance. Excavations in test pit 1, on the slope, where T-0 contacts the T-1b never reached the Rodgers alluvium. The relative thickness of Stratum A in test pit 1 may be explained as sediments redeposited from the terrace crest through processes of slopewash, perhaps aided by modern disturbance.

Collections

Ceramics - see Table D-3.3

Lithics

Collections from 23BE653 come primarily from the excavations of the three test squares because of the dense vegetation cover and dry conditions on the surface. Only six tools were collected from the surface: 2 unifacial scrapers, 1 bifacially worked scraper, 2 general bifaces, and 1 projectile point. The point, one of only three from the site, was an unclassifiable straight stemmed form.

Six additional tools were collected, primarily from the crest of the terrace during the shovel-testing phase. These included 1 axe, 1 biface fragment, 1 cleaver, 2 cores, and 1 piece of groundstone.

Both tools and debris were found in large quantity in the three test pits. For ease of presentation and interpretation, the artifacts from the excavations are given in

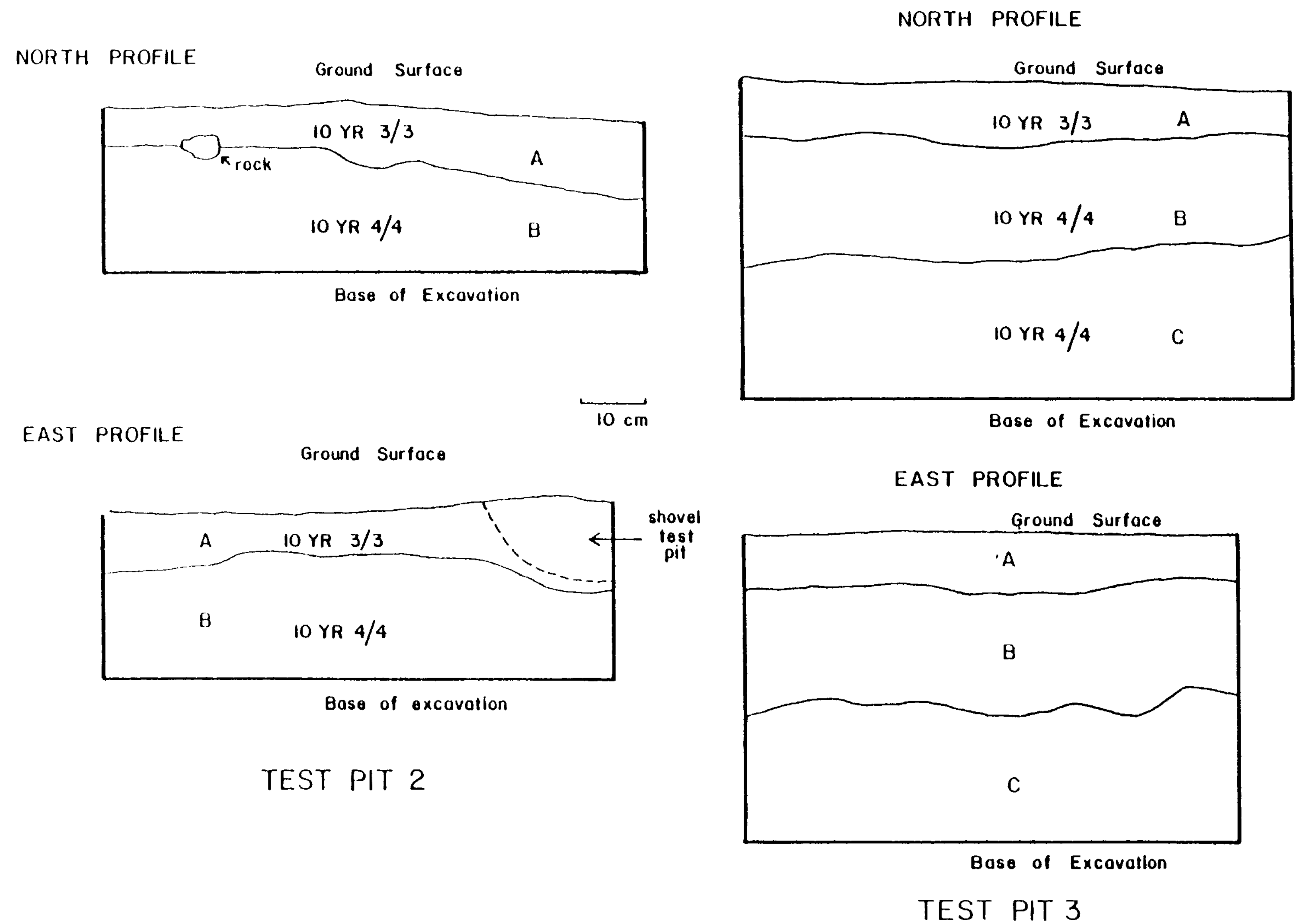


Figure 3.7. Profiles of test pits 2 and 3 at 23BE653.

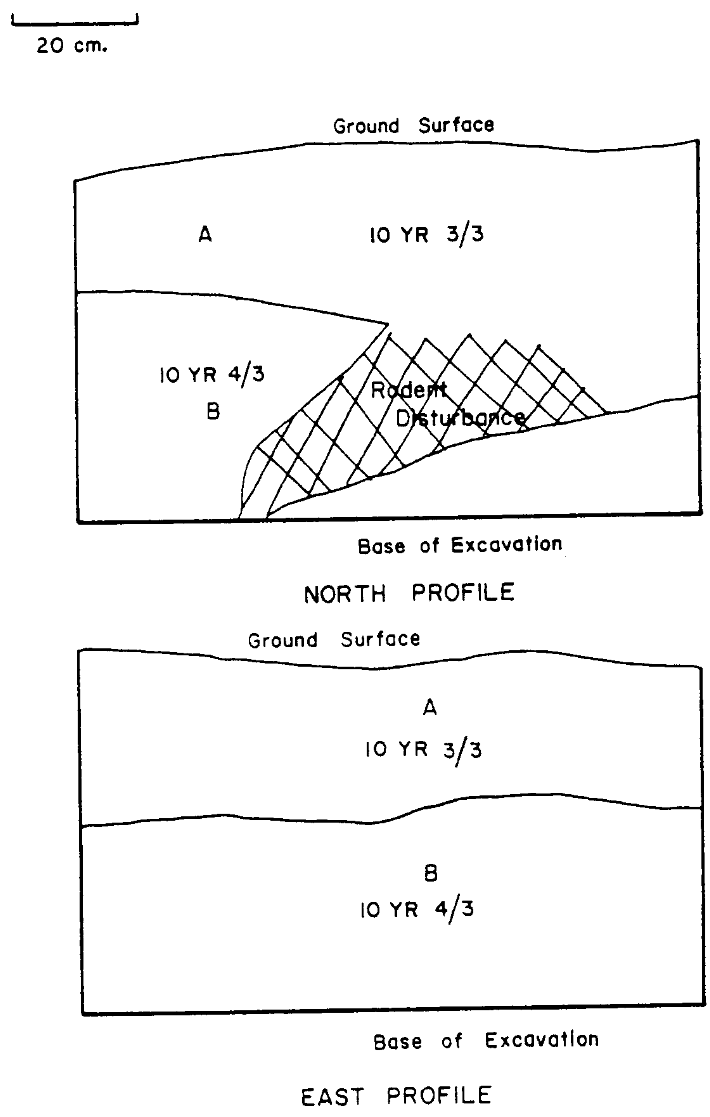


Figure 3.8. Profiles of Test Pit 1 at 23BE653.

tabular form; tools (Table D-3.4) and debris (Table D-3.5) are tabulated separately. The debris from test pit 1 was fully described while that from pits 2 and 3 was tabulated so that for those two squares only complete flakes were classified (i.e., primary, secondary, or tertiary); the others were tabulated as flake fragments (see Reagan, Vol. II for further explanation). Comparisons of type and density of debris will be made in the next section.

It can be seen from the tabulations (Table D-3.4) that a wide diversity of lithic tools were present at 23BE653. Scrapers make up the largest percentage of the tool inventory and are of three different forms, including convex, straight and generalized. Bifaces constitute only a small proportion of the assemblage. Two of those were identifiable as projectile points. The specimen from test pit 1 is identifiable only as a general corner-notched specimen (Type 364), while the arrow point from test pit 2 is a Late Woodland Scallorn form (Type 322).

The detailed description of debris from test pit 1 (Tables D-3.5 and D-3.6) allows tentative determination of the relative importance of various lithic manufacture activities taking place at the site. That initial stages of reduction occurred at the site is evidenced by the large number of cores, chunks, raw material, and shatter. Other signs of tool manufacture include three blanks, a blade, a preform, and several primary flakes. However, the most numerous of the debris is that which results from final stages of lithic manufacture or from tool maintenance. In test pit 1, 470 (90.91%) of the unmodified flakes were tertiary forms. Ten bifacial trim-flakes also recovered in that square are the debris from these final stages. That these final stages of manufacture were important is further supported by the size grading of the fragmentary flakes from test pit 1 (Table D-3.6). While the size of a flake fragment may not be directly proportional to its original intact size, there is a relative trend, with smallest fragments being part of small flakes. The fact that 68.71% of the flake fragments were smaller than 1.5 cm^2 and 81.40% were smaller than 2.0 cm^2 indicates that a large proportion of the site's debris probably came from final production and maintenance of lithic tools.

The identification of the chert type of the debris and tools recovered in test pit 1 (Table D-3.7) gives some indication of patterns of chert procurement at the site. Ray (Vol. II) had predicted on the basis of his chert survey at 23BE676 – only a .3 kilometer southeast of 23BE653 – that we might expect to find Jefferson City Chouteau, and Burlington cherts in the percentage of 75%, 10%, and 15%, respectively, in assemblages at the site. The proportions of these three chert types actually observed at the site vary significantly from Ray's predictions. Excluding from consideration those

pieces which were unidentifiable, or of a chert type other than the predicted three, a goodness-of-fit test (Table 3.1) shows that such a distribution of debris could probably not have occurred by chance. While the sample of tools is fairly small, a similar test comparing the predicted to the observed chert proportions used for tools (Table 3.2) yields somewhat different results; the actual distribution is closer to that predicted. In both cases the use of Jefferson City chert was close to the expected, Chouteau was overrepresented and Burlington extremely underrepresented. The disparity in results between tools and debris is difficult to explain. Had the proportion of various cherts used for tool manufacture departed significantly from the predicted chert availability, we might posit that they had been manufactured elsewhere and imported to the site. Since that is not the case, we must assume that Chouteau chert was favored for lithic tool production to the exclusion of Burlington and that the well-made tools do not reflect this selection due to the small sample size.

Intrasite Comparison

On the basis of soil profiles and debris and artifact distributions (Tables D-3.4 and D-3.5), it appears that the cultural material at 23BE653 represents a single component. The vertical distribution of debris shows that there is a concentration of remains primarily in the upper three excavation levels. The level of this concentration varies somewhat across the site. On the crest of the terrace in test pit #2 the highest debris density occurs very near the surface. In test pit #3, which is slightly off the terrace top, debris density is highest from 10 to 40 cm below the surface. Test pit #1, on the terrace slope also has its highest concentration of lithics between 10 and 40 cm below the surface. It appears that erosional processes may have caused redistribution of soil and cultural material, stripping the crest of the terrace and transporting that material downslope. The most concentrated midden, therefore, is exposed on the terrace top and somewhat buried on its slope. In all three test pits there is a continuous distribution of debris from the surface to the base of the excavations. Below the most dense portion of the midden there is a small amount of debris, perhaps deposited there by natural processes by roots, rodents, or weathering. In any case, only a few pieces of material have been deposited in the Rodgers alluvium and it can be assumed that most, if not all, of the material was culturally deposited after the formation of the T-1b terrace. Diagnostic artifacts give little clue as to the time depth of the occupation. The single identifiable projectile point and the pottery, all found in the densest levels of midden, can be assigned to the Late Woodland period. Since the debris and tool distribution is continuous, it is possible that all of the materials at the

TABLE 3.1

23BE653 — Chi-Square Goodness-of-fit of Chert Debitage Utilization to Predicted Availability

	Observed	Expected	X^2
Jefferson City	298	293.0	.09
Chouteau	91	39.1	68.89
Burlington	2	58.7	54.71

$X^2 = 123.69$ df = 2 $p < .001$

TABLE 3.2

Chi-Square Goodness-of-fit of Chert Tool Utilization to Predicted Availability

	Observed	Expected	X^2
Jefferson City	23	20.25	0.37
Chouteau	4	2.70	0.63
Burlington	0	4.05	4.05
			5.05

$X^2 = 5.05$ df = 2 $.10 > p > .05$

site were deposited sometime during that period. More diagnostic artifacts or radiometric dates would be necessary to confirm this.

The density of debris and artifacts at the site varies horizontally. Test pit #1 contains far more material than either of the other two squares. This disparity in density may be partially explained by redeposition of materials downslope. However, the disparity seems too great to be fully explained by natural processes. In the 10 to 20 cm level alone there were twenty-three lithic tools in test pit #1. Also, in the 40-50 cm level in that square there was a concentration of large rocks including a core and a blank. While there seemed to be no significant patterning to this feature, it is unlikely that those materials had been redeposited. Rather, it appears that this was the locus of intensive activity, probably a tool production area. Because testing was limited to three 1x1 meter squares, it is impossible to know how extensive such intensive activities were.

Summary and Recommendations

The Cootie West Site, 23BE653, was occupied at some time during the Late Woodland period. The temporal span of the occupation is difficult to discern due to a limited number of diagnostic artifacts and the absence of suitable radiometrically dateable materials.

The size of the site was impossible to determine because of its limited surface expression. Limited testing has shown that portions of the site have been disturbed with the original midden truncated on the terrace crest. The area on the terrace slope appears to be intact and also contains the most concentrated portion of the midden; debris and tool densities there were both extremely high.

Debris at the site is indicative of several stages of lithic manufacture. Both initial reduction of chert and final processing and maintenance occurred at the site. This manufacture resulted in a large diversity of tool forms, suitable for use in a variety of activities. Hunting and butchering are indicated by the presence of bifaces, knives, and scrapers. Wood and hide working are evidenced by an axe, a cleaver, and a variety of scrapers. Food preparation may account for the presence of a piece of groundstone and fragments of pottery.

Under normal circumstances further testing at 23BE653 would have been recommended. Its high artifact density and undisturbed deposits have the potential for yielding valuable information about the Late Woodland period. Additionally, confirmation of the temporal span of the occupation of the

site would be desirable. However, due to the site's low elevation, logistics made such testing impossible. Time permitted the intensive excavation of only one site before the preimpoundment of reservoir waters to an elevation of 670' in July 1977. The Cootie Site, 23BE676, which is 0.3 kilometers to the southeast of 23BE653, was chosen for such investigations. Both sites contained Late Woodland material and extremely high artifact densities, but 23BE676 appeared to have greater depth and better preservation. The fact that the two sites appeared to be very similar and that 23BE676 was intensively investigated does not minimize the effects of the loss of information at 23BE653. Should the reservoir waters recede, further testing at the Cootie West Site is recommended.

REFERENCE CITED

Allgood, Ferris P. and Ival D. Persinger
1979 Missouri general soil map and soil association descriptions. U. S. Department of Agriculture Soil Conservation Service State Office, Columbia, Missouri.

PART III

CHAPTER 4

TEST EXCAVATIONS — 1978-A

by

V. Ann Tippitt

Site 23HI280

LOCATION AND BACKGROUND

Site 23HI280, a moderate lithic scatter, is located on the front edge of a small terrace overlooking the confluence of Little Mill Creek and the Pomme de Terre River (Fig. 4.1). The site is roughly elliptical in shape and lies at an elevation of about 700' AMSL. The site was initially recorded during Stage 2 transect survey and at that time was measured as 300 m^2. Reasonably accurate site boundaries were difficult to determine because of heavy tree cover (oak, hickory, sycamore) and thick underbrush. A modern recreational road or trail crosses the site, and cultural debris is exposed in the road on the flat of the terrace. Immediately east of the site the slope rises sharply up the rock bluff (Fig. 4.2).

EXCAVATIONS

Two 1 x 1 m squares were excavated in areas of the site that had been subjected to minimal recent disturbance. These units were excavated for the dual purpose of discerning the depth of cultural material and to test for the presence of undisturbed cultural deposits. Both units were excavated in 10 cm arbitrary levels from the surface. All fill was screened through 6.35 mm (1/4") mesh hardware cloth.

The stratigraphy in both units was essentially the same and revealed a thinly developed forest soil. The upper 10 cm of each profile was modern leaf litter. A 20 cm thick humus layer (10YR4/2) was below the leaf litter. Below the humus was a 20 cm thick layer of sandy silt with a Munsell color reading of 10YR5/2. This was followed (50-80 cm BS) by a layer of sandy clay (10YR5/4). From 80 cm below surface to the bottom of the excavation was a layer of clayey silt (10YR5/6).

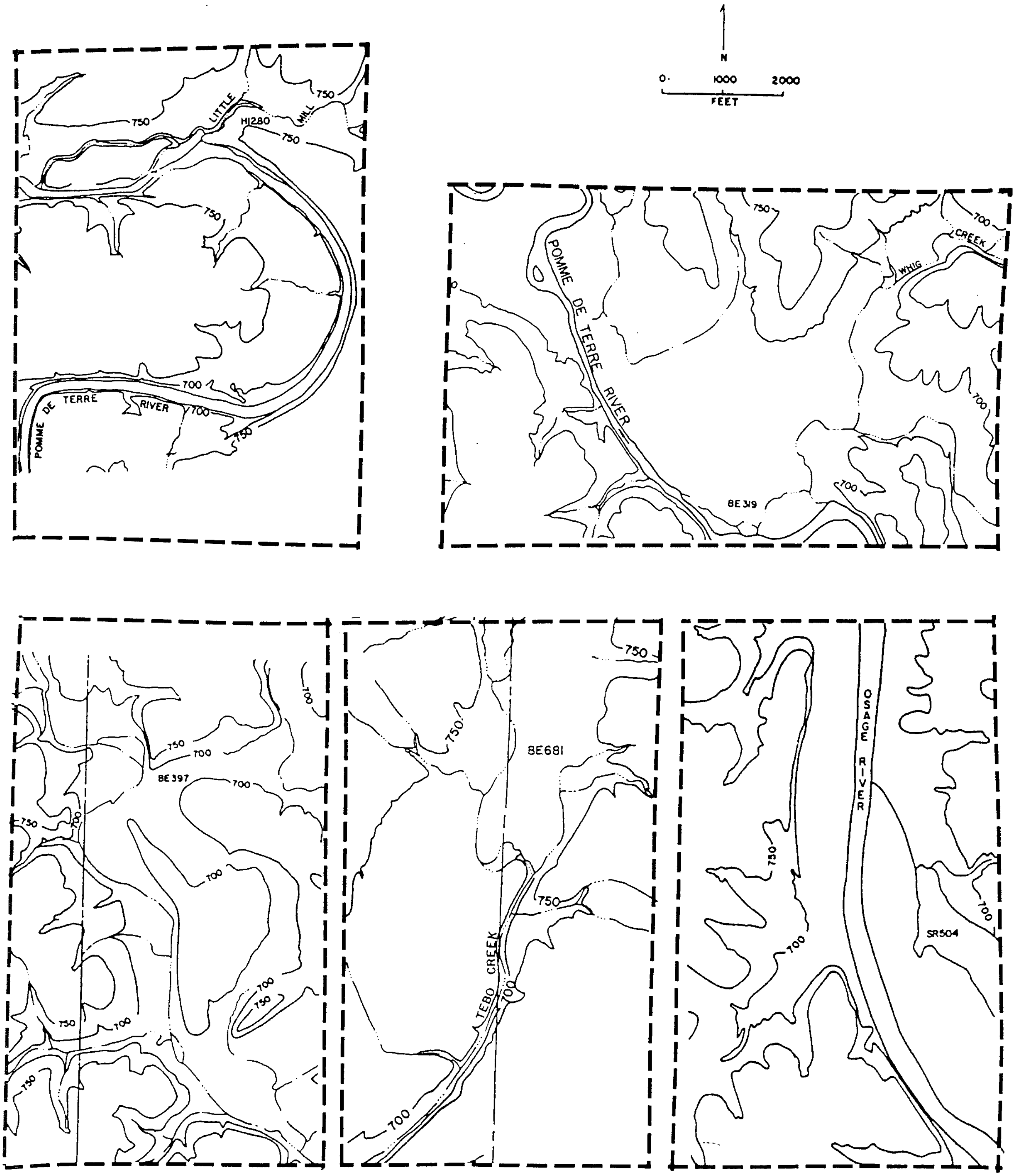


Figure 4.1. General location maps.

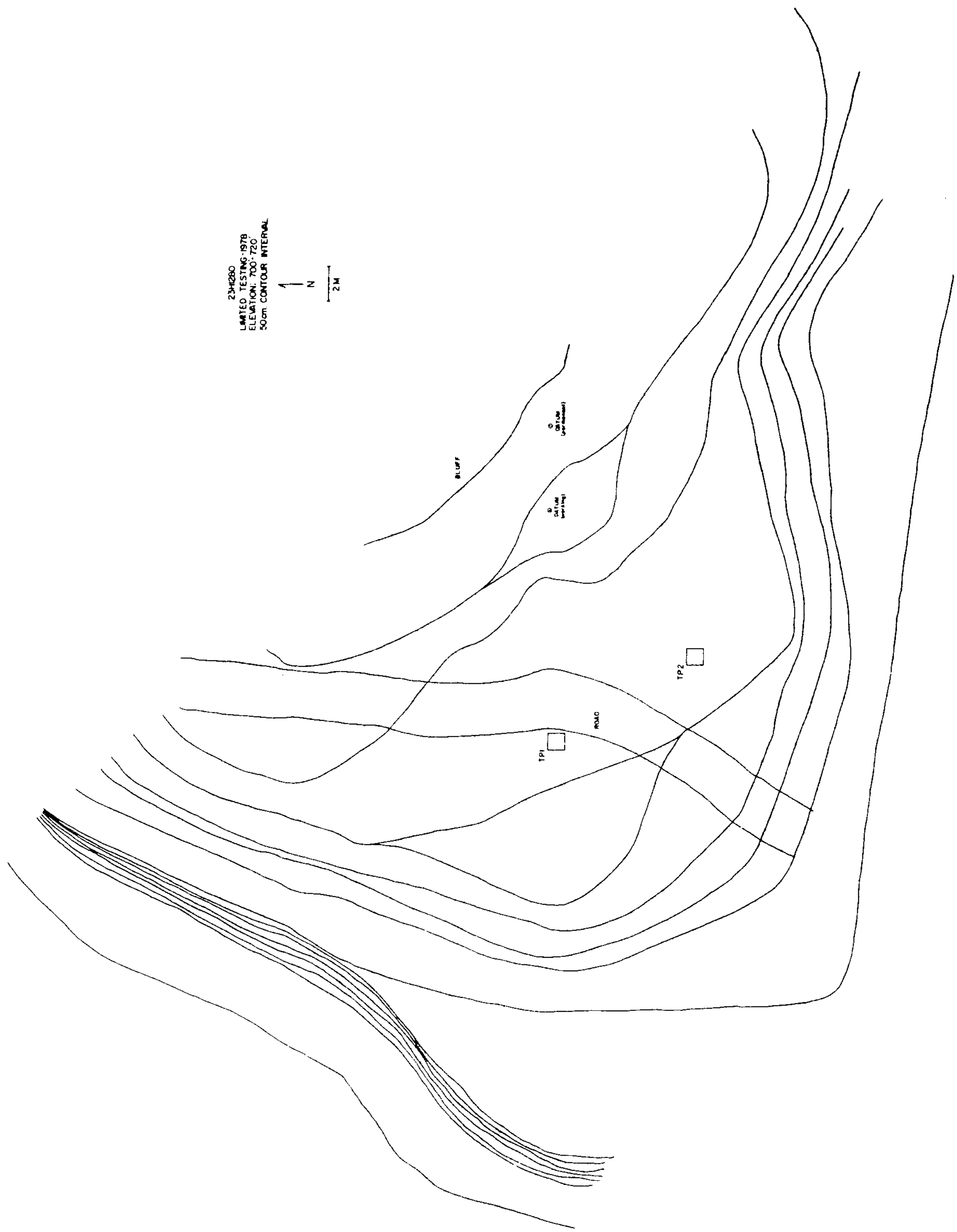


Figure 4.2. Site map — 23HI280.

THE COLLECTIONS

The collections from 23HI280 are comprised entirely of lithics, the distribution of which is shown in Table D-4.1. Cultural materials occurred to a depth of 1.10 m in 9S 8W and to a depth of .80 m in 1S 14W; however, the majority of debris was in the upper 40 cm. This zone contained a side-notched biface, a large piece of limestone, a large piece of sandstone, a parallel-sided biface with a slightly expanding stem, and small flecks of charcoal throughout in 1S 14W. The same zone in 9S 8W produced a biface tip and a reworked side-notched biface. The complete range of recovered debris by morphological class is shown in Table D-4.2.

An important orienting concept in the approach used by the lithics laboratory was that of reduction. Accordingly, an alternative classification of the lithics collection would consider not morphological class but reduction stage. Table D-4.3, therefore, presents frequency distributions for items at various stages of reduction. Clearly the act of reduction was important at the site as over 95% of the debris is either flakes or shatter. More detail, however, is available from examination of the reduction level represented by the flakes (Table D-4.4). Although tertiary flakes are predominant, nearly 10% of the flakes (primary, secondary) were derived during the early stage of manufacture. Many of the flakes, however, are small. Measurements of intact flakes are summarized in Table D-4.5, while flake fragments were size-graded and are tabulated in Table D-4.6. Very little of this debris was modified (Table D-4.7).

All five projectile points were identifiable. They include one each of Cooper (Category 311), Rice Side-Notched (Category 325), Truman Broad-Bladed (Category 328), Etley (Category 339), and a straight-stemmed form (Category 336) that is probably Late Archaic in age. Overall, therefore, the projectile points suggest Late Archaic and Woodland components are present at 23HI280.

SUMMARY AND RECOMMENDATIONS

Site 23HI280 is a small bluff-base, creek-side camp on a low terrace of the Pomme de Terre River. Brief test excavations suggest that while the surface is disturbed by recent activity, subsurface deposits are intact. Lithic reduction debris is relatively dense. The site is currently inundated, and given its elevation, should be in the active zone of the reservoir. Since 23HI280 has some depth, however, and since deeper deposits may be subject to less disturbance than are surface materials, it is possible that further information might be obtainable. If the reservoir falls to a level which not only would expose the surface but also permit an excavation at least a meter deep, then further, more extensive, excavations might be warranted.

Site 23BE319

LOCATION AND BACKGROUND

Site 23BE319, a moderate lithic scatter, is located on a levee remnant in the Pomme de Terre River floodplain near the confluence of Whig Creek between 650 and 700' MSL (Fig. 4.1). This site was first recorded by the 1975 Truman Reservoir Stage 1 survey and was in an overgrown, previously cultivated field when shovel tested by Wogaman in 1978. Ground visibility was less than 20%. Therefore, additional site boundary definition data were not gathered and excavation units were located with the aid of previous survey and testing evidence.

EXCAVATIONS

Previous surface collections and shovel tests had revealed artifacts along a small rise in a previously cultivated field near Whig Creek. Four 1 x 1 m excavation units were placed along this rise to determine the vertical and horizontal extent of the cultural deposits. The plowzone was 20-25 cm thick and was removed as a single level. Excavation proceeded in 10 cm arbitrary levels below the plowzone to a depth of 1.10 m below ground surface in three of the four units. All material was dry screened using 6.35 mm (1/4") mesh.

The profiles of the excavation units did not reveal any midden staining or soil development. The plowzone was a silty loam and ranged from 20 to 25 cm in thickness. Below the plowzone was a silty clay (Rodgers alluvium) that was undifferentiated in the 1.10 m excavation profile. Numerous rodent burrows were evident in all units.

THE COLLECTIONS

Although several bifaces and unifacial scrapers were recovered from the surface, only three biface fragments and debitage were recovered from the excavation (Table D-4.8). A total of 224 flakes were recovered.

Cultural material was recovered to a depth of 1.10 m below ground surface (Table D-4.9). Lithic debris was sparse and scattered. There was a very slight increase in debitage and biface fragments between 60 and 80 cm below ground surface, but no diagnostic artifacts were recovered.

SUMMARY AND RECOMMENDATIONS

Site 23BE319 is a small lithic scatter with very light density. Its age is indeterminate. The site is now inundated, but no further work would have otherwise been recommended.

Site 23BE397

LOCATION AND BACKGROUND

Site 23BE397 is located in the upper reaches of the Tebo Creek drainage on a gradual slope. This slope is oriented northwest with the site overlooking Tebo Creek (Fig. 4.1). The site elevation is between 650 and 700' MSL. A small intermittent stream cuts through the deposits and prehistoric cultural material was collected during the 1978 transect survey.

Currently major portions of the site are covered by woods (oak and hickory), thick underbrush, and an open area popular with local campers and picnickers. Numerous campfires and modern debris make prehistoric site boundary definition difficult. Ground visibility was less than 25% adjacent to the intermittent stream cutbank where prehistoric materials were previously collected and noted.

A random surface collection yielded numerous bifaces, biface fragments, and debitage. Additional surface finds were plotted during excavation. Most of the artifacts came from eroding edges of a small intermittent stream channel. A 10 cm thick, dense concentration of flakes and artifacts could be seen in the stream cutbank about 15-20 cm below the present ground surface. This concentration was lying above a dense compact silty clay zone.

EXCAVATIONS

To determine the depth, areal distribution, and structure of this artifact zone, a grid was established and four 1 x 1 m excavation units were laid out; two of these units were north of the intermittent stream and two were south of it. The units were excavated in 10 cm arbitrary levels with shovel and trowel. All material was dry screened using 6.35 mm (1/4") mesh hardware cloth.

A one meter wide profile was cleaned on the southern edge of the intermittent stream which revealed a stratigraphic sequence of leaf litter, a thin humus layer, and a hard, dense (silty clay 10YR5/2) clay zone, an extension of the ridge to the east of the site (clay 10YR6/3). This stratigraphic sequence was repeated in all excavation unit profiles. Cultural material was confined to the thin humus layer, although a few flakes were found in the upper portions of the underlying clay. Excavation did not extend beyond 40 cm below the ground surface.

THE COLLECTIONS

Chipped stone bifaces and debitage were the only artifact classes recorded. The distribution of artifacts by arbitrary level is shown in Table D-4.10.

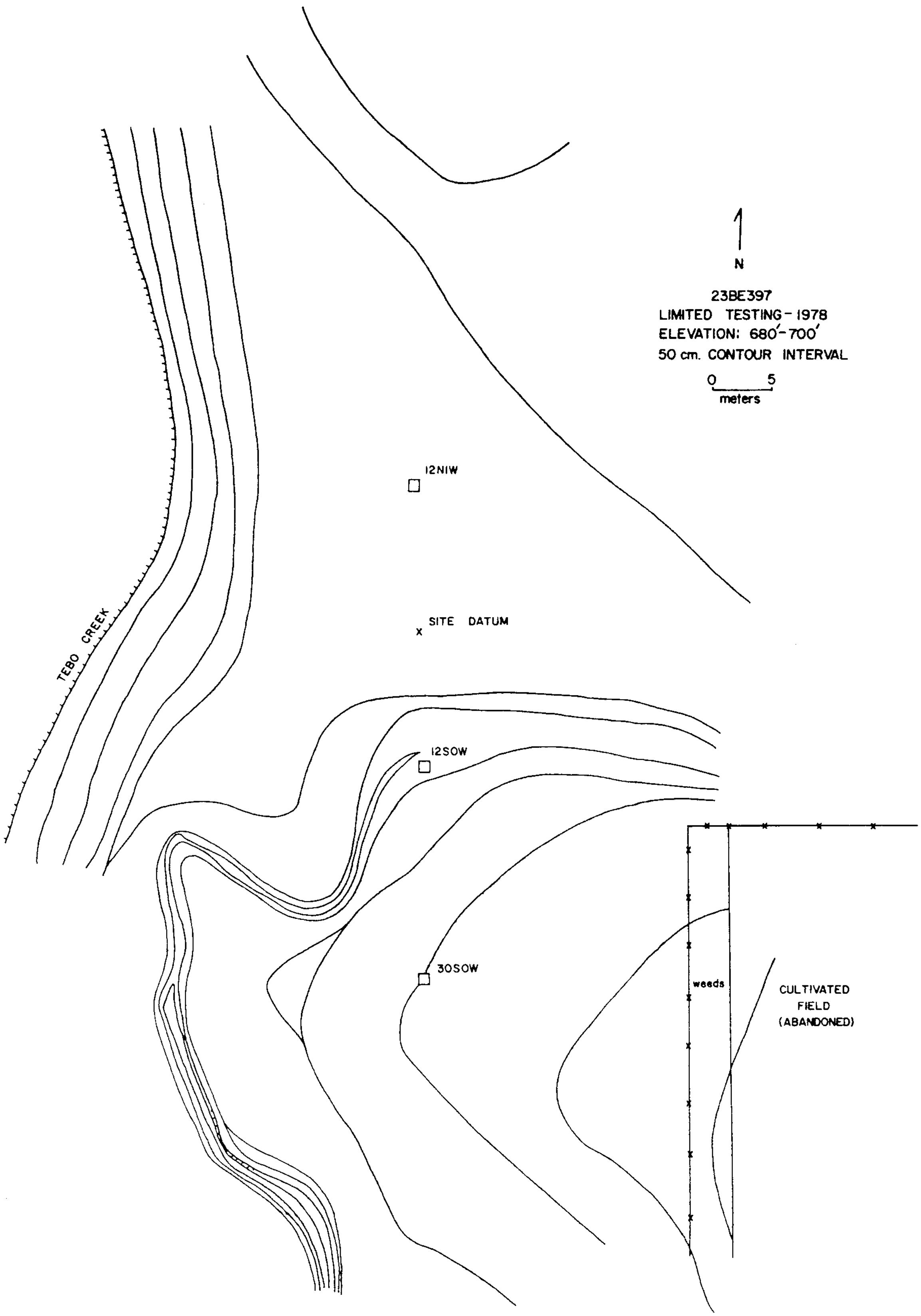


Figure 4.3. Site map - 23BE397.

As can be seen in Table D-4.11, 71% of the excavated cultural materials are flakes. The distribution of flakes by reduction stage is shown in Table D-4.12. Although all stages of the reduction sequence are represented, 90% of the flakes are tertiary. Seventy-eight percent of the flakes are less than 15 mm in size. Most of the bifaces recovered were broken and only a very small percentage of the flakes were utilized or retouched (Table D-4.13).

The number of very small flakes made identification of the raw material present difficult. Chert type of most of the flakes was indeterminate because of the small size (Table D-4.14).

The testing of 23BE397 revealed a thin concentration of debitage along the slopes of a small intermittent upland stream. Although some completed tools were recovered, most of the debitage represents the final stages of lithic reduction or artifact resharpening. The four excavation units did not reveal any features and cultural material was confined to the upper humus zone. No diagnostic artifacts were collected; therefore, the cultural affiliation of the site has not been determined. It is unlikely that further significant information will be recovered from the now inundated 23BE397. Should it be again exposed by draw-down, drought, or other fall in lake level, a surface reconnaissance for the primary purpose of obtaining diagnostic materials might permit the test excavation data to be better integrated with data from other investigated sites.

The Red Tail Site – 23BE681

LOCATION AND BACKGROUND

Site 23BE681 is located between a small intermittent stream and Tebo Creek at an elevation of 700' MSL (Fig. 4.1); it was located during Stage 3 transect survey in 1978. At the time of the survey, the field had just been plowed and a large scatter of lithic artifacts was visible on and along a ridge running northwest-southeast through the cultivated area. Two areas of artifact concentration were identified, and pottery was among the items collected during surface survey.

EXCAVATIONS

Surface observations were made just after plowing and the horizontal extent of the site could be determined. The lithic debris, bifaces and pottery were confined to a rise that appears to be associated with a low area, possibly an old channel of Tebo Creek. To determine the vertical extent of the site, eight 1 x 1 meter excavation units were placed

along and just east of the rise in the field. All excavation was by shovel and trowel in 10 cm arbitrary levels. All material was screened using 1/4" mesh.

The profiles of all the excavation units were consistent: a 20-25 cm thick plowzone, a 15-20 cm thick zone of silty loam (10YR4/2), overlying a homogenous unit of clayey silt (10YR4/3). The profiles revealed no midden staining or distinctive soil zone.

THE COLLECTIONS

Lithic artifacts and pottery were recovered from the surface and from the excavation units. No lithic material was recovered below 60 cm and no pottery was found below 50 cm. The distribution of artifact categories by excavation unit can be seen in Tables D-4.15, D-4.16 and D-4.17. The frequency of all artifact categories is presented in Tables D-4.18 and D-2.19. All stages of the lithic reduction process are represented in the debitage (Table D-4.20).

A total of 180 intact flakes were recovered. The majority of the intact flakes are small thinning flakes or tertiary flakes (Table D-4.20). Seventy four percent of the flake fragments are less than 15 mm (Table D-4.21). The frequency of modified flakes is shown in Table D-4.22. Although many of the flakes are small, it was possible to identify eight different chert types in the collection (Table D-4.23).

Three hafted bifaces were recovered from the excavation: one broken Synders point (lateral margin and haft element); one small corner-notched point with a slightly expanding stem; and one Scallorn point with slightly serrated margins.

A total of thirty-three sherds was collected from the surface during the initial survey (Table D-4.24) and forty-three sherds were recovered from the excavation (Table D-4.25). All of the sherds are small and highly weathered. The majority have a smooth or plain surface and the predominant tempering material is limestone. The temper size varies from .5 mm to 1.0 mm in diameter. Temper density is 20-30%. The paste, temper and thickness of these sherds are similar to those attributes described for pottery characteristic of the Highland Aspect. The small rim from the surface collection has a slightly everted profile.

Site 23SR504

LOCATION AND BACKGROUND

Site 23SR504 is located on a T-1b terrace of the Osage River which is 260 meters to the west (Fig. 4.1). An intermittent stream curves around the southern half of the site on the east and south sides (Fig. 4.4). At the time the site

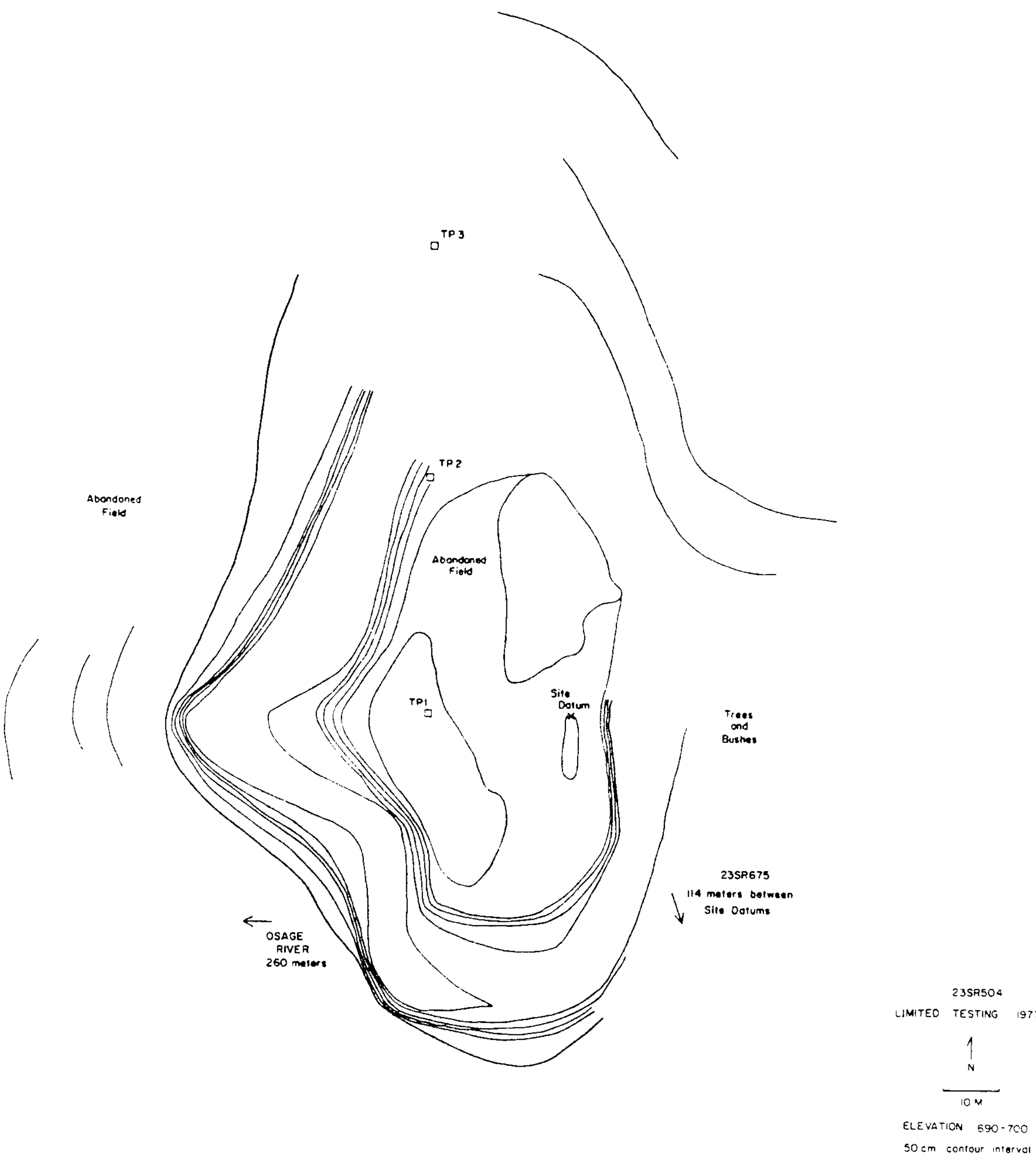


Figure 4.4. Site map — 23SR504.

was tested, high grass covered the site. The trees in this area had been cut and stacked during the clear cutting phase of reservoir construction. Therefore, the surface of the site was uneven and disturbed. Cultural material was recovered from the surface of the site, but nothing was recovered from the sides of the intermittent stream.

During the 1978 season, backhoe testing for buried archeological deposits was conducted at several localities along the Osage and Pomme de Terre rivers (see Joyer, this volume). Two trenches at 23SR504 revealed cultural material to a depth of 2.5 meters. Flakes and one complete biface were recovered during this testing from Hole 56. Hole 56 was located at the southern end of the site and indicated the possibility of three separated components: one on the surface, a second component between 1.10 and 1.50 meters and a third component between 2.20 and 2.50 meters. Cultural material was also recovered from the second hole (58). This trench was placed about 85 meters north of Hole 56. The artifact density in Hole 58 was much lighter and separate components could not be identified.

EXCAVATIONS

With the vertical and horizontal extent of the site fairly clear, three 2 x 2 meter units were excavated in August 1978 to gather information to characterize and identify the three possible cultural components. Test Pit 1 (1N 25W) was placed next to backhoe hole 56, test pit 3 (83N 25W) was placed next to backhoe hole 58 and test pit 3 (44N 25W) was located halfway in between test pits 1 and 3.

The stratigraphy revealed in the test pits was very consistent. The upper 35-40 cm zone was a loamy humus containing numerous roots. Below this the deposits are a homogenous and undifferentiated clayey silt ranging in color from 10YR4/3 to 10YR4/4. There is evidence of bioturbation in all units. The clay is an expanding montmorillonite; drying cracks that have been filled with lighter, finer grained materials are numerous throughout the deposits. Although small flecks of charcoal can be seen in some areas, there is no midden staining or evidence of features in the profiles.

Test Pit 2 was excavated to a depth of one meter. Only one flake was recovered from this unit. The debris density in Test Pit 3 was also extremely light and confined to the upper 70 cm. Test Pit 1 contained light debris in the upper 40 cm, a 40 cm zone of sterile deposits and a second component between 1.30 and 1.90 m. The artifact distribution for Test Pit 1 is shown in Table D-4.26.

The total artifacts by category are shown in Table D-4.27. Ninety-four percent of the flakes are small tertiary or trim flakes (Table D-4.28). There were 134 intact flakes recovered. The size of the intact flakes and the size grade range of flake fragments are illustrated in Tables D-4.29 and D-4.30. More than 90% of excavated flakes were unmodified (Table D-4.31).

The large number of small flakes makes raw material identification difficult. Over 50% of the chert from 23SR504 is either indeterminate small or indeterminate (Table D-4.30). However, Jefferson City chert predominates the identifiable specimens.

As seen in Table D-4.26, the majority of the artifacts recovered is from the lower component. The distribution of the artifacts in this component is:

Artifact Category	Frequency
Cores	1
Chunks	3
Raw material	1
Flakes	
Primary	3
Secondary	39
Tertiary	717
Shatter	270
Bifaces	
Complete	5
Fragments	15

Five projectile points and one fragment were recovered from levels 12 to 16.

Level 13	1 small side-notched point
Level 14	1 biface (base missing)
	1 small corner-notched point - Afton
Level 15	1 contracting stem base fragment
	1 contracting stem point
Level 16	1 corner-notched point fragment

The data recovery at 23SR504 revealed a small lithic scatter in the upper 40 cm of the site and at least one buried component along the southern edge of the site. This component appears to date to the Late Archaic. The density and diversity of the debitage and artifacts indicate the full range of artifact production.

There was not enough time to excavate the lower component indicated by the backhoe trench. Further excavation was planned for the summer 1979 but the site was inundated during the spring of 1979. Should the water level fall to a level where an excavation to a depth of 2.5 m could be conducted without serious water problems, additional investigations at this site would be recommended.

PART III

CHAPTER 5

TEST EXCAVATIONS, 1978 – B

by

Cynthia M. Stiles-Hanson and Susan K. Goldberg

Pleasant Hill Site – 23BE204

LOCATION AND BACKGROUND

The Pleasant Hill Site, 23BE204, was originally identified during Stage 1 survey in June, 1975. The site is located in Alexander Township, Benton County, approximately 1.5 kilometers southwest of the old town site of Fairfield. Situated on the southern bank of a meander of the Little Pomme de Terre River, the site is in an area bordered on three sides by the river. Site 23BE204 is an open site, located on a T-1b, 25 to 50 meters from the river's edge and 10 meters above it (Fig. 5.1). Soils in the general area are classified as the Hartsville-Ashton-Cedargap-Nolin association (Allgood and Persinger 1979). Most of the outcroppings in the area are Jefferson City chert occurring in the river valley and its walls, with Chouteau and Burlington outcropping at a higher altitude (Ray Vol. II).

At the time of the survey, 23BE204 was identified in a fallowing field. A tree line separated the field from the river and also from the intermittent creek to the southeast. Visibility at this time was poor, however, the survey team was able to determine a large crescent area of cultural scatter approximately 230 m long and 35 m wide as the site area (Fig. 5.2).

The site was revisited in May 1978. By this time, the tree line had disappeared and the whole area north and south of the river had been bulldozed and flattened. Distinct contours and site dimensions were impossible to determine, however, ground surface visibility was 100%. At this time extensive survey revealed two areas of scatter lying roughly within the boundaries set by the 1975 survey. These two areas were separated by approximately 50 meters of sterile ground. The area lying within the meander was labelled

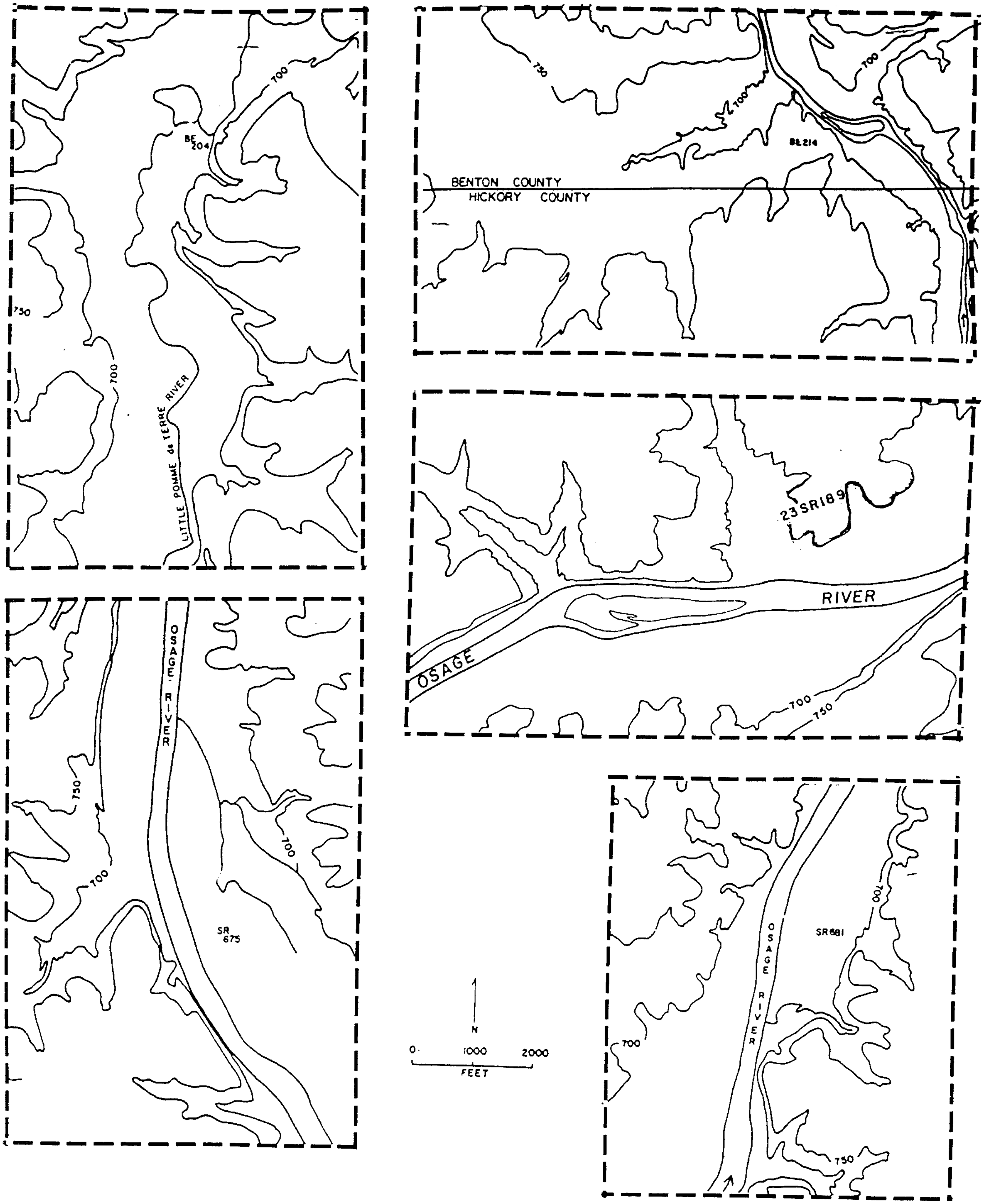


Figure 5.1. General location maps.

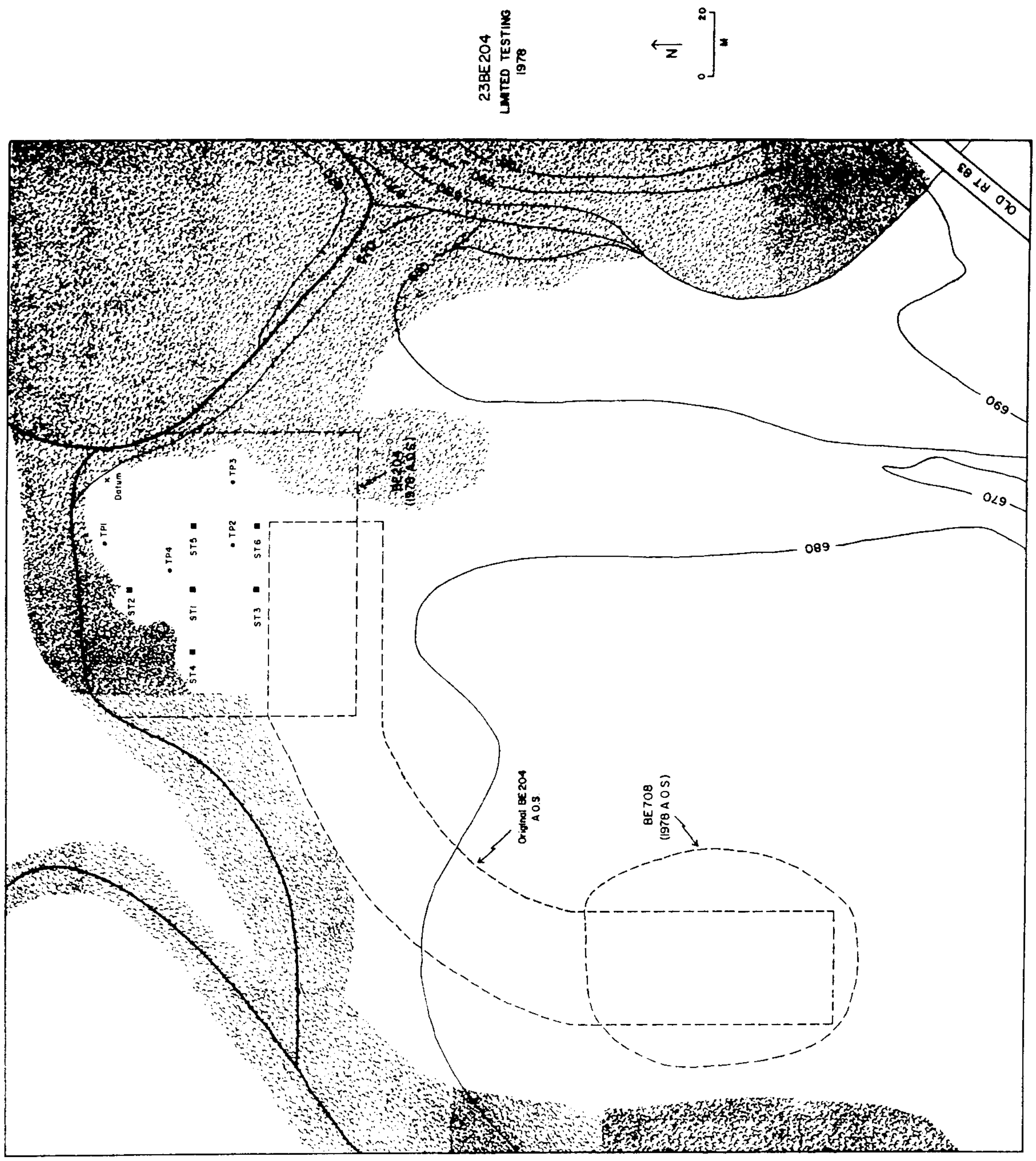


Figure 5.2. Site map — 23BE204.

23BE204, the area southwest of this was designated a new site, 23BE708 (Fig. 5.2).

Six shovel test pits were sunk into 23BE204 at the time of the resurvey and cultural material was found to a depth of 45 cm below present ground surface. Artifact concentration appeared to surround test pit 1, in an area approximately 20 meters in diameter (Fig. 5.2). An extensive surface collection was done on BE708.

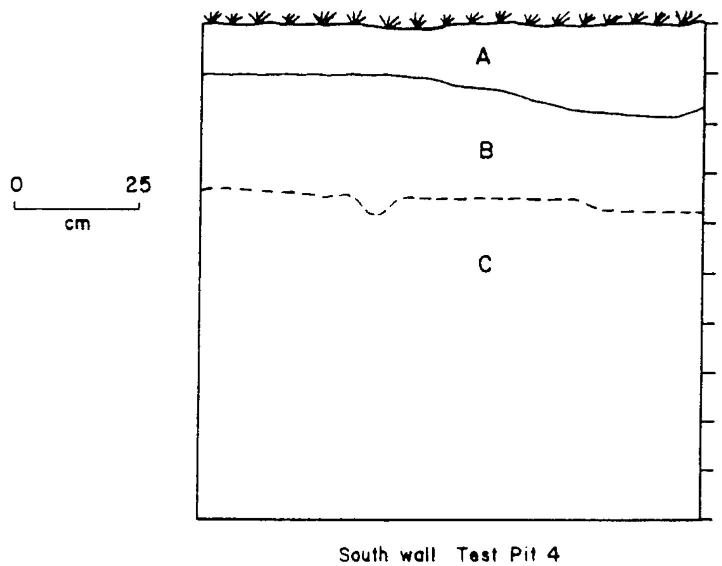
EXCAVATION STRATEGY

Four 1 x 1 meter excavation units were opened in July 1978 in the area newly designated 23BE204. Each unit was shovel-scraped in levels of 10 cm and fill was passed through a 1/4" mesh screen. Pit 1 (00S, 20W) was taken down to 70 cm below present ground surface. At this level, historic pottery was found, and the decision was made to abandon the pit due to a prior disturbance below plow zone. Pit 2 (40S, 20W) was taken down to 61 cm below present ground surface, the level at which no cultural material was found. Pit 3 (40S, 01W) was taken down to 110 cm below present ground surface, also the level at which no cultural material was found. Pit 4 (20S, 31W) was the unit in which a feature was located. The original 1 x 1 m square was taken down to a depth of 100 cm below present ground surface, the end of the cultural material, all except the southwest corner which was pedestalled at 30 cm below present ground surface. Three .5 x .5 meter extensions to this pit were dug: Pit 4a (20S, 32W, SE1/4) taken to 50 cm below present ground surface; Pit 4b (21S, 32W, NE1/4) taken to 43 cm below present ground surface; and Pit 4c (21S, 31W, NW1/4) taken to 42 cm below present ground surface (Fig. 5.3b). These four areas constituted Feature 1. Profiles of the west and south walls were drawn for Pits 1, 3, and 4. Cores on Pit 3 were taken in all corners to a depth of 126 cm below present ground surface. Cores in Pit 1 were taken in all corners to a depth of approximately 1 m below present ground surface. All cultural and lithic material was collected and cataloged according to pit and level.

STRATIGRAPHY

Pit 1 appeared to have very little soil change throughout the excavation (Fig. 5.4a). In the uppermost layers, the soil was described as very dark brown to dark brown, dry clayey silt. At approximately 25 cm below present ground surface, soil with less silt, more gravel, and higher clay content was reached, the color remaining the same. This may represent a contact between plowzone and deeper soil. At 55 cm below present ground surface, the soil appeared to contain more silt and some sand, becoming slightly darker. Extensive lithic debris, mainly cultural, was found in all

a.



b.

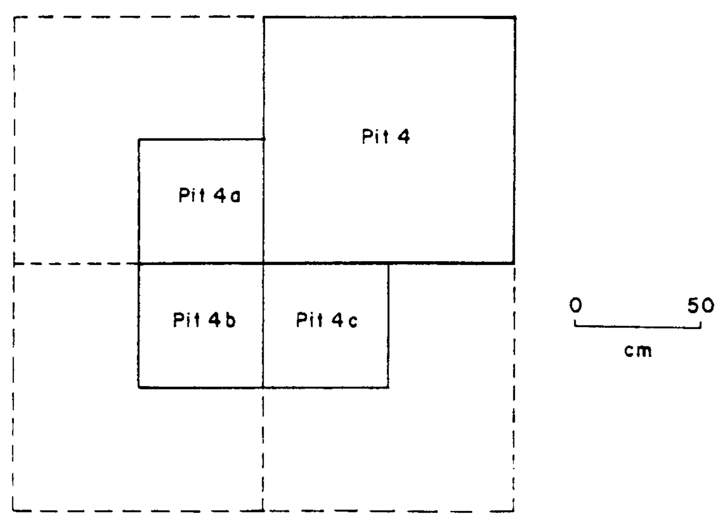


Figure 5.3. Profile (a) and excavation plan (b), Test Pit 4, 23BE204.

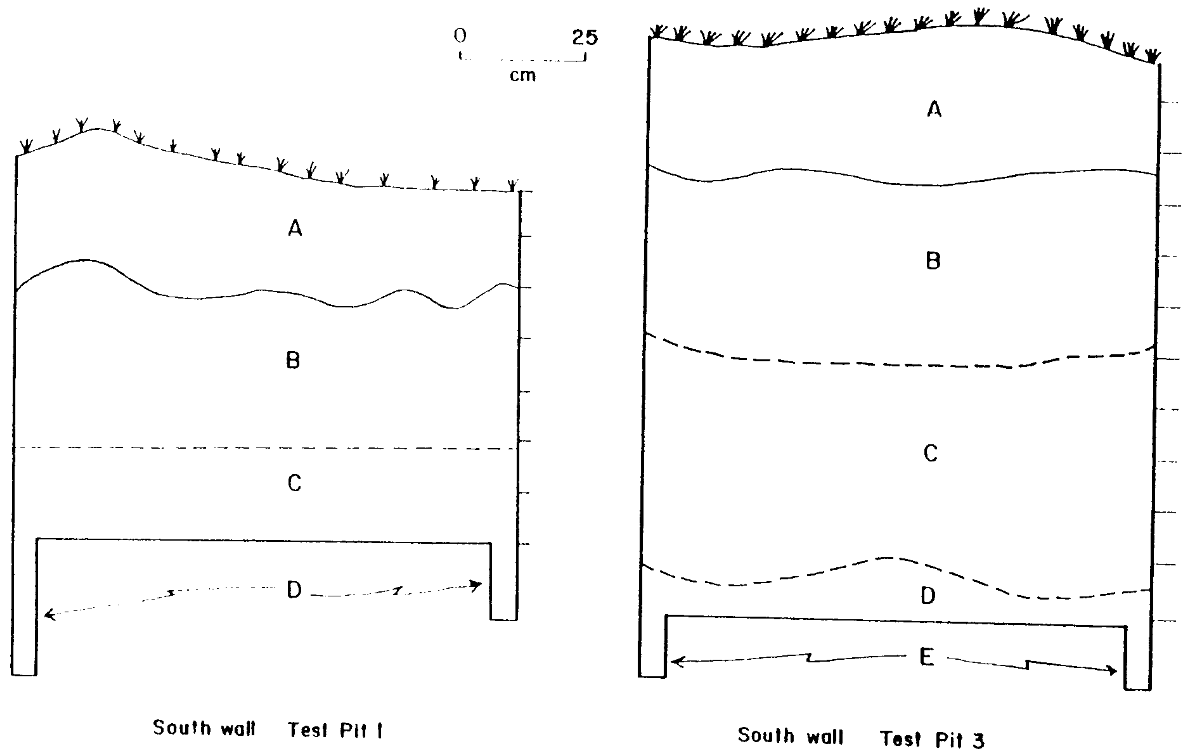


Figure 5.4. Profiles, Test Pits 1 and 3, 23BE204.

levels to a depth of 35 cm below present ground surface and gradually tapered to nothing by 60 cm below present ground surface. Gravel, concretions, and siltstone pebbles increased in frequency as cultural lithics decreased. Teeth, extremely well preserved large mammal bone fragments, and historic pottery were found at a depth of 65 cm below present ground surface at which time the unit was abandoned due to this prior historic disturbance. Cores dug into the corners of this pit revealed a continuance of similar soil with a considerable amount of charcoal intermixed at the bottom.

Pit 2 also appeared to have very little soil change throughout. The top levels were described as dark to light brown dry clayey silt with a high organic content. At approximately 40 cm below present ground surface, the soil gradually changed to a moister reddish brown silty clay. Most cultural material, consisting of metal wire and historic pottery as well as prehistoric lithics, was found concentrated between 15 and 30 cm below present ground surface within the plowzone. Almost nothing was found below 50 cm below present ground surface.

The upper levels of Pit 3 consisted of a brown to dark brown dry silt with a slight clay content (Fig. 5.4b). At approximately 25 cm below present ground surface, a slight color and moisture change, dark brown to reddish brown, with a red and yellow mottling was noticed; gradually, from 50 cm below present ground surface, gravel and clay content increased as depth increased, and clay content increased. Cultural material in the form of flakes and shatter was fairly consistent throughout all levels in the square. Cores taken in all corners to 126 cm below present ground surface revealed a continuation of this soil but with an increase in gravel, sand, and some charcoal.

Since Pit 4 contained the feature, it is necessary to combine the soil descriptions from Pit 4a, 4b, and 4c with Pit 4. Soil in this area appears to be relatively similar to other areas of the site (Fig. 5.3a). The topmost layers contain a brown to dark brown silty clay with root and worm action to a depth of approximately 25 cm below present ground surface. Soil cracks were extensive to this depth also. Below approximately 30 cm below present ground surface, the soil increased in clay content and decreased in worm and root action, with no appreciable color change. Lithic material, including that in the feature, was concentrated between the depth of 15 cm to 45 cm below present ground surface and sharply decreased below 60 cm below present ground surface. It is important to note that there was no color or texture change in the soil of the feature levels.

CULTURAL MATERIAL

Historic

Three artifacts from 23BE204 may be attributed to the historic period. Two fragments of historic crockery were found — on each in Test Pits 1 and 2. In Test Pit 2, a piece of wire was also recovered. The depth of the historic pottery in Test Pit 1 (65 cm below surface), as well as dark clayey soil, high in organic content to a depth of more than 70 cm, indicates that the prehistoric component of the site has been disturbed. Fragments of well-preserved large mammal bone and tooth fragments from that test unit probably also date to the historic period.

Lithic Tools

A large diversity of tool forms manufactured from chert was recovered at 23BE204 (Table D-5.1). The largest category in terms of frequency was bifacial projectile points. Seventeen dart points were found during the 1978 investigations, and three others came from the initial survey in 1975. The surface specimens number thirteen and represent eight different types, diagnostic of both the Late Archaic and Woodland periods. Points which probably were manufactured during the Woodland period are two Rice Side-Notched (325), one Scallorn (323), two Cooper-like (311). Points which may date somewhat earlier, perhaps to the Late Archaic period are two Gary (330), two Standlee (332), one Truman Broadblade (328), and one Table Rock Stemmed (342). Another specimen from the surface was too fragmentary to identify.

Some of the projectile points recovered from excavated context are similar to the surface specimens. Two Standlee points were found; one was in the plowzone in Pit 4, and the other was from 35 cm in Pit 2 and probably was also in the plowzone. Another specimen from the plowzone was a Table Rock Stemmed point from Pit 4. Only two classifiable points were recovered below the plow zone. One of these, a side-notched form (320), was from Pit 1; while it was below the plowzone, it may have been redeposited from elsewhere due to historic disturbance in that area of the site. From Pit 3, at 70 cm below surface, came a shallow side-notched form (359) which resembles a Rice Side-Notched point but is stubbier and smaller.

Other forms of bifacially flaked tools recovered from the site include three ovate forms, one triangular specimen, and twelve fragments. Two bifacially flaked scrapers were recovered, as well as two blades and a chopper.

Unifacial scrapers were quite numerous and are of a variety of shapes. That class includes four straight, two notched, and one convex, irregular and spokeshave forms.

Lithic Debitage

A large amount of chert debris was recovered during the excavations in 1978 (Table D-5.2). Several thousand pieces of shatter and miscellaneous rock were in the midden. Additionally, eight chunks and two pieces of raw material, three cores, and two pieces of hematite were found.

Flakes account for less than one-third of the debris at 23BE204. Broken flakes made up 91.1% of the flake assemblage. The complete flakes differed in distribution among primary, secondary, and tertiary forms depending on whether they were modified. Of the 121 unmodified flakes, 11.6% were primary, 14.0% were secondary, and the remaining 74.4% were tertiary. Three flakes were modified by utilization or battering; two were primary and the other was secondary. The largest class of modified flakes was trim flakes; nineteen flakes exhibited evidence of having been flaked from a larger tool.

Only a small number of the lithics recovered from the site were identified by chert type and source in the laboratory. Of the 170 pieces examined, there were 42 Jefferson City, 12 Burlington, 8 Roubidoux, 2 Chouteau, and 9 exotic; the rest were indeterminant. Since the sample is highly variable (a number of different surface and excavation units as well as different debris classes) any comparison with the naturally occurring cherts in the area would be misleading.

INTRASITE COMPARISONS

It can be seen from both the tool (Table D-5.1) and debitage (Table D-5.2) frequencies that there is some variability horizontally across the site. The southern portion of the site, represented by testing in Pits 2 and 3 (Figure 5.2) exhibits less activity than the northern part. All classes of debitage are much less frequent in Pits 2 and 3 than in Pits 1 and 4.

While it is apparent that the most intensively used area is in the north, differences do exist between Pits 1 and 4. The larger, earlier stages of debitage (shatter) occur in Pit 1 in over twice the frequency of Pit 4. Similarly, miscellaneous rock is over four times as abundant in Pit 1. Conversely, tools and flakes are more frequent in Pit 4. These differences are almost impossible to assess. The appearance of historic material at 65 cm below surface and anomalous but consistent soil in that depth in Pit 1

lead to the conclusion that most, if not all, of the materials in that square have been redeposited.

Further difficulty in assessing intrasite variability is encountered because Pit 4 cross-cut a feature (Fig. 5.5). The feature consisted of several types of rock (chert, limestone and sandstone) seemingly randomly placed. Some may have been fire-cracked and traces of charcoal were present. No other signs of burning were visible. This feature area was probably the locus of fairly intensive activity. Twenty-five of the thirty-two chert tools recovered during excavation were from Pit 4 and its extensions. In fact, the only forms recovered in other areas were biface fragments and projectile points (Table D-5.1). All of the trim flakes also came from the area of the feature. Thus, while tools and debris from the feature area may give some clue to types of activities occurring at the site, it can not serve as a basis for comparison of differential midden deposition across the site.

The vertical distribution of materials throughout the site seems to exhibit a single mode. The greatest density of shatter, miscellaneous rocks, flakes, and tools occurs variably between 20 cm and 50 cm below the surface. There are certainly no breaks in the distribution of cultural material until the bottom of the midden at approximately 70 or 80 cm.

Discussion

In the absence of chronometric dates from Site 23BE204 (no datable material was recovered), the occupational history of the site is somewhat vague. Projectile forms are typical of both the Late Archaic and the Woodland periods. However, there are two problems with such an indirect temporal assessment. First, all but one of the points were from disturbed contexts – either from the surface or the plowzone. Second, many of the forms which may have originiated during the Late Archaic period may have persisted into the Woodland period in this region. For example, Table Rock Stemmed forms are typically Late Archaic, but at HI297 appear in a component dated at 425 B.C. $\pm$ 250 (Appendix B, Vol. I). Still another Table Rock Stemmed specimen was dated – and this one, directly – at A.D. 1400 $\pm$ 50 (Appendix B, Vol. I). Both Gary and Standlee points may have a similarly long history.

From the vertical debris and tool distribution at the site, it appears that there were probably no long periods during which the site was abandoned. Occuation may have been continuous or a series of repeated usage. A major portion of the occupation was probably during the Woodland period.

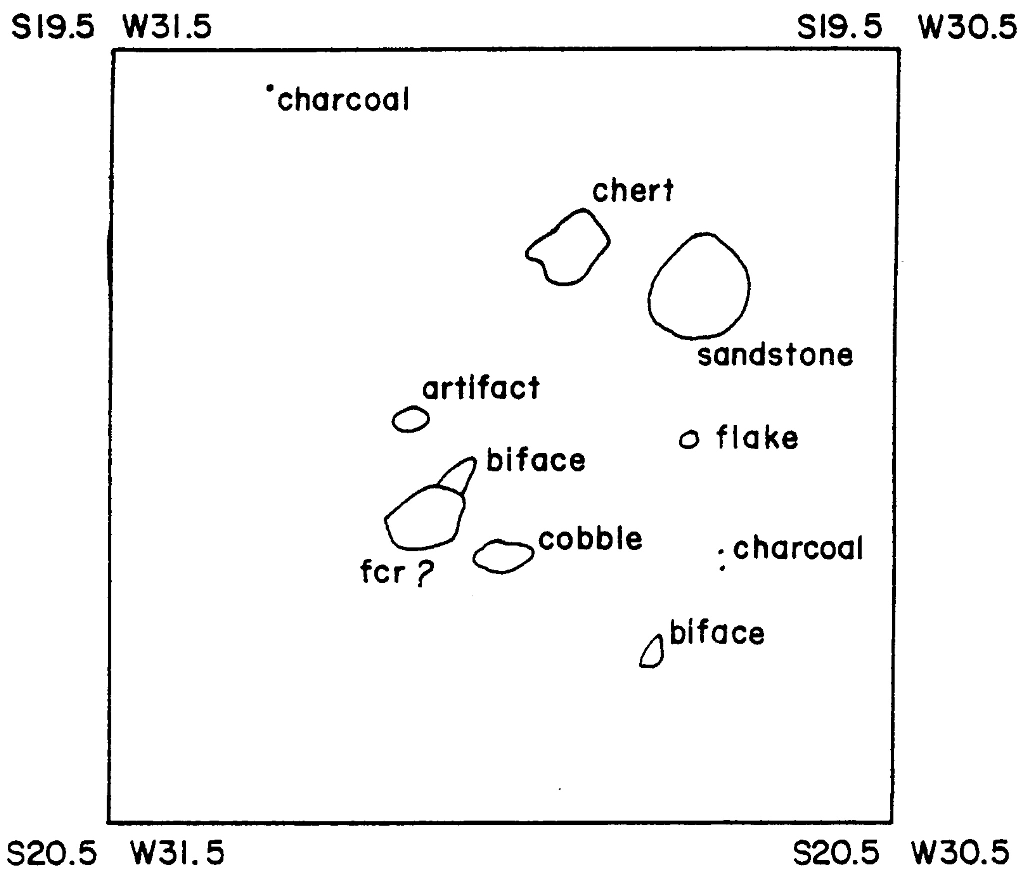


Figure 5.5. Feature 1 in Test Pit 4, 23BE204.

The function of the occupation is also difficult to assess. Most of the activity indicators came from a single test unit. Test Pit 4, the unit containing Feature 1, contained a fairly diverse tool inventory. Five forms of unifacially flaked scrapers and a bifacially flaked scraper may indicate that leather or woodworking, or butchering were major activities. Bifaces and blades probably indicate hunting and butchering activities. Cores, shatter, flakes, and trim flakes are the result of lithic manufacture and maintenance activities. The distribution of various flake forms at the site differs from many other sites in respect to proportion. The percentage of tertiary flakes (74.4%) to the others is somewhat smaller than elsewhere, when it is not unusual to find 90.0% or more tertiary flakes. Given the small proportion of complete flakes (8.9%) to fragmentary flakes, conclusions are only tenuous, but it appears that final lithic reduction was less intense at 23BE204 than at other tested sites. The presence of several trim flakes confined to the area of Feature 1 shows that tool maintenance was occurring at least in that locus.

CONCLUSIONS AND RECOMMENDATIONS

The Pleasant Hill Site, 23BE204, appears to have been occupied fairly continuously at least during the Woodland period. Part of the site, in the extreme north, may have been heavily disturbed by subsequent occupation during the historic period. Much of the site, however, appears to remain intact below plowing and bulldozing disturbance. The area of greatest archeological potential is near the center of the surface scatter. This area may have seen the most intense prehistoric activity; the other areas have fairly sparse cultural deposits.

Site 23BE204 is a potentially significant archeological resource for two reasons. First, the tool inventory is both diverse and large. Not only were a large number of different projectile point forms recovered from the site, but many of them are not normally associated with each other in single sites in the reservoir area. A larger sample from the site might allow a better understanding of the relationship of some of the Late Archaic and Woodland assemblages in southwest Missouri. Analysis of co-occurrences of artifact types and functional studies would enhance cultural-historical studies through the determination of the relationship of groups using different artifact classes. At the present time it is unclear whether certain artifact assemblages represent coeval but culturally distinct groups, changing tool form through time, or merely distinct tool kits for different activities.

A site like 23BE204 becomes particularly significant for answering such cultural-historical questions not only

because of its density and frequency of artifacts, but because of its degree of preservation. There is some evidence that, at least in the central portion of the site, there is much depth to the cultural deposits thus maximizing the potential for separation of components through time. Moreover, the Pleasant Hill site is one of the few in the study area where cultural features are preserved. Such features permit the study of intra-site variability of prehistoric activity and have potential for yielding chronometric dates from a clear context. Too many interpretations from the reservoir area are necessarily based on data derived from undifferentiated middens where the relationship between the tool assemblages and living surfaces is unclear.

Given the fact that at an elevation of 675' MSL the Pleasant Hill site will be inundated before any further field work would be possible, there are two recommendations for further work on the collections. A series of thermoluminescence dates on existing collections might allow tighter temporal control on the assemblage. The temporal range of surface artifacts might then be indirectly determined. Second, functional analysis of materials from each component may supply data for statements about the cultural adaptations represented by formally different artifact assemblages.

The Pippins Site – 23BE214

LOCATION AND SPECIFIC ENVIRONMENTAL SETTING

The Pippins Site, 23BE214, was originally identified during Stage 1 survey in June 1975. Situated in Cross Timbers Township, Benton County, 23BE214 is approximately .2 km north of the Benton-Hickory county line (Fig. 5.1). Two other sites were also identified in this area at the time of the survey: 23BE215, approximately 65 meters to the northwest; and 23BE217, approximately 30 meters due north of BE214 (Fig. 5.6).

These three sites fall within the study area of the Pomme de Terre River as described by Wood and McMillan (1976). They are situated 10 m from the west bank of a double meander of the Pomme de Terre, approximately 20 m above the river (Chomko [1977] described this west meander as a stream). The sites are on a T-3 (Roper, personal communication), an old, heavily eroded terrace which now resembles a series of rolling hills, each site originally identified on top of a hill. Soils in the general area of these sites are classified as the Lebanon-Goss-Bardley-Peridge and the Hartville-Ashton-Cedargap-Nolin associations (Allgood and Persinger 1979; see also Johnson 1977: 93 and map). All three sites are open sites in ungrazed pasture of thick high grass. Pippins Cemetery, removed prior to

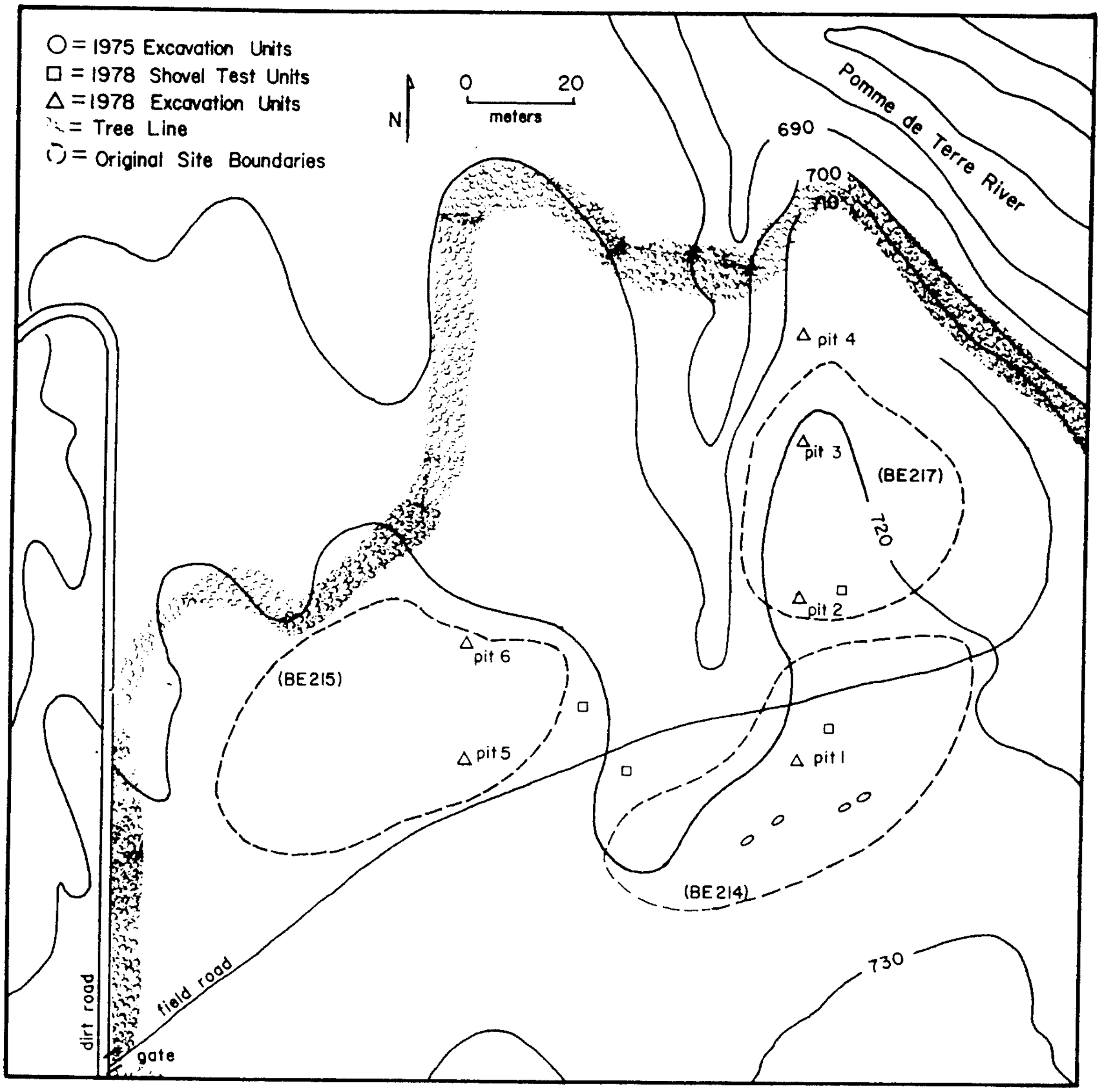


Figure 5.6. Site map, 23BE214.

the survey, had been located on top of a hill between 23BE214 and 23BE215. A house, also removed prior to the survey, stood near the gate to the pasture adjacent to 23BE215. Most of the chert outcroppings in the area are of good quality Jefferson City chert; small outcrops of poor to fair Chouteau and Burlington occur on the east ridges of the Pomme de Terre (Ray, Vol. II).

BACKGROUND TO 1978 EXCAVATION

In 1975 preliminary surface collection on 23BE214 revealed bifaces and debitage as well as historic material, and on 23BE215 projectile points, bifaces and debitage were found. No collection was made on 23BE217 because of the extremely poor visibility. At the same time, 23BE214 was also tested. Four 1.5 m test pits were dug well within the estimated boundaries described for this site (see Chomko 1977 for details of that excavation).

In June 1978 these sites were resurveyed to determine whether or not further testing was necessary on 23BE214. Four shovel test pits were dug: one each in 23BE214 and 23BE217 and two in 23BE215. For surface survey visibility was again poor, less than 20%. However, during the ensuing three years a field road had been cut, splitting 23BE215 in half and coming between 23BE214 and 23BE217, ending at the tree-lined bluff above the river. All along this dirt road and in isolated clear patches in the pasture was a continuous scatter of flakes and cultural debris. This discovery, along with the newly defined T-3 designation, changed the outlook previously held for this area. Instead of the rolling hills of a dissected upland with three separate sites, as described by Chomko in 1977, it now appeared that the terrain was a very old eroded terrace with a continuous scatter of cultural material throughout. It was then decided that these three sites should be designated one site, 23BE214.

The decision was made to excavate additional areas of this site for several reasons. First, the T-3 designation and the relationship of the site to the river appeared to be optimum for an old deposit; Chomko's test excavation and survey gave tentative evidence of this (a possible Dalton point). Second, the 1978 resurvey shovel tests (see map, Fig. 5.6) revealed a great deal more depth to the site than Chomko's original tests; cultural material was found to a depth of 53 cm in the northern area of the site as opposed to the small amount of material found below the plowzone in the area Chomko originally tested. Third, because of the difference in interpretation between 1975 and 1978, only a very small part of the site had been tested. As a result of this, it was decided that excavation should be carried out on the areas not covered by Chomko in 1975; i.e., the areas originally designated 23BE215, 23BE217 and the extreme north end of Chomko's original 23BE214 (Fig. 5.6).

EXCAVATION STRATEGY – 1978

Six 1 x 1 meter excavation units were opened in the area described above. Each unit was shovel-scraped in levels of 10 cm. All fill was passed through a 1/4" mesh screen. Pits 1 through 4 were located on the eastern ridge. Pits 1 (00N, 15W) and 2 (30N, 15W) were taken down to 20 cm below ground surface and abandoned in order to concentrate on areas not tested by Chomko. Pits 3 (60N, 15W) and 4 (80N, 15W) were each taken down to approximately 45 cm below ground surface, the level at which no cultural material was found. Two pits, 5 (00N, 75W) and 6 (25N, 75W) were opened on the western ridge and both taken down to approximately 40 cm below ground surface, again the level at which no cultural material was found. All cultural and lithic materials were collected and catalogued according to pit and level. Profiles of the west and north walls were drawn for Pits 1, 2, 3, 6. Profiles of the south and west walls were drawn for Pits 4 and 5.

STRATIGRAPHY – 1975 EXCAVATION

Two soil stratigraphic layers were described by Chomko (1977). The upper plowzone layer, extending to 20 cm, was "structureless, dark yellowish brown (10YR4/4) clayey silt with chert inclusions and abundant material" (Chomko 1977: 12). The lower layer, extending to 35 cm was "fine, subangular blocky dark yellowish brown (10YR4/4) clayey silt with dark reddish brown (5YR3/4) mottles and many pebble-sized chert inclusions" (Chomko 1977: 12), and no cultural material.

STRATIGRAPHY – 1978 EXCAVATIONS

Eastern Ridge – Pits 1, 2, 3, 4 (Fig. 5.7)

Soil on this ridge appeared as two strata separated by a transitional zone. The top layer, represented in all four pits, consisted of a dry, compact dark brown (10YR5/4, 10YR4/3, 10YR3/4) fine silt (which dries to light gray) with slight orange mottling, and a high organic content mostly in the form of roots. This layer averaged in depth from 10 to 20 cm below ground surface. Towards the end of this level, the soil gradually increased in moisture, mottling and clay content, and its color became a more reddish/yellow (10YR4/3). The lowest layer, beginning at approximately 25 to 30 cm below ground surface, contained a wetter, very highly consolidated clay content, again slightly redder with increased orange mottling. Gravel was abundant in all layers with its highest accumulation in the lower level. Cultural material, consisting of both historic and prehistoric artifacts, was concentrated in the top, plowzone level. A few flakes were found at a depth of 35 cm below ground surface in Pit 3 and 45 cm below ground surface in Pit 4 (see profile drawings).

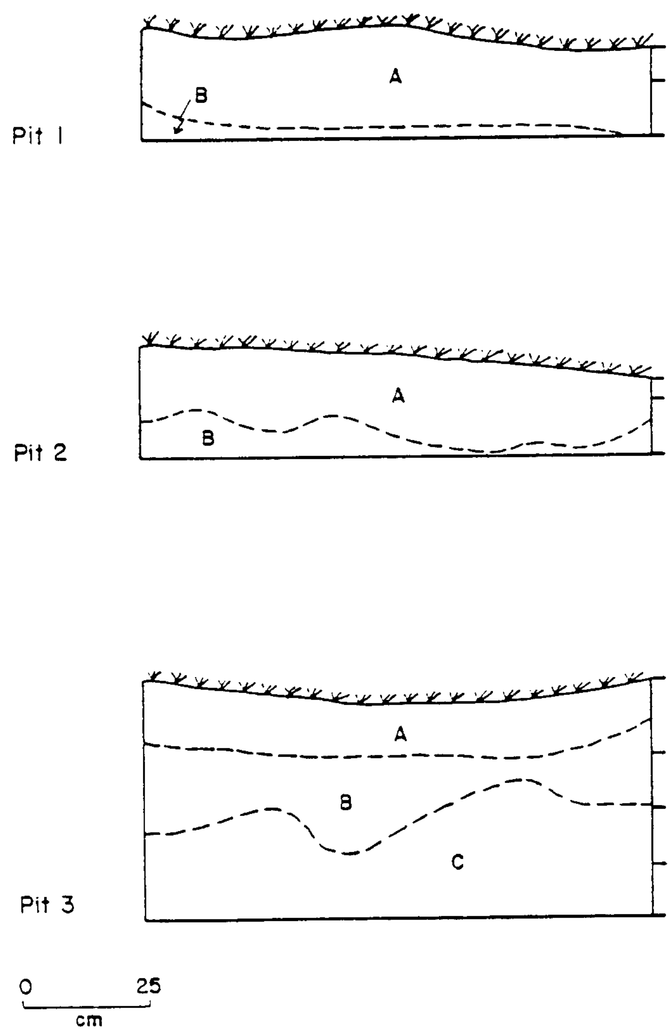


Figure 5.7. Profiles of Test Pits 1, 2, 3, at 23BE214.

Western Ridge — Pits 5 and 6 (Fig. 5.8)

The soil on this ridge appeared similar to that of the eastern ridge. The uppermost layer consisted of a very dry hard-packed silt, dark brown in color (which dries to light gray) with almost pure clay inclusions. The bottom layer, beginning approximately 15 to 20 cm below ground surface contained hard packed reddish/brown clayey silt with an increase in clay inclusions and a spotting of manganese. As on the eastern ridge, artifacts were concentrated in the top plowzone level; a few flakes were scattered in both pits to a depth of 27 cm below ground surface. Gravel was also abundant in these pits with equal concentrations in both soil layers (see profile drawings).

At first glance, there seems to be a very great difference in soil descriptions between 1975 and 1978 excavation seasons. However, in comparing Munsell colors, the actual difference is minimal. The variety of color descriptions could be due to moisture context, dryness, lighting and/or excavator interpretation. The color according to Munsell and the silt/clay content actually alludes to the same soil description (see Johnson 1977: 73 for description of T-3 soil core taken in the general vicinity).

THE COLLECTIONS

Historic European Materials

Historic materials were recovered from the surface and plowzone in all test squares with the exception of test pit 3 but were most abundant in test pit 1 (Table D-5.3). Those materials consisted of twenty-seven ceramic sherds, two hundred thirty pieces of brick, eighteen fragments of bottle glass, and ten square headed nails. These items can be ascribed to the turn of the century (Noel-Hume 1969) and are probably associated with the house which had been removed from the site prior to the 1975 survey.

Lithics

<u>Projectile Points</u>

Fifteen projectile points or fragments had been collected in 1975 by Chomko. Two of those were from the surface, twelve from the plowzone, and only one from below the plowzone. Those points have been described in detail (Chomko 1977: 12-17). Only three projectile points were recovered during the investigations subsequent to 1975. A Plainview point was found on the surface during a 1977 resurvey of pre-Hypsithermal sites. The other two specimens were recovered from the 1978 excavations — a Dalton point from test pit 1 and an early side-notched specimen from test pit 6. Both were in the plowzone.

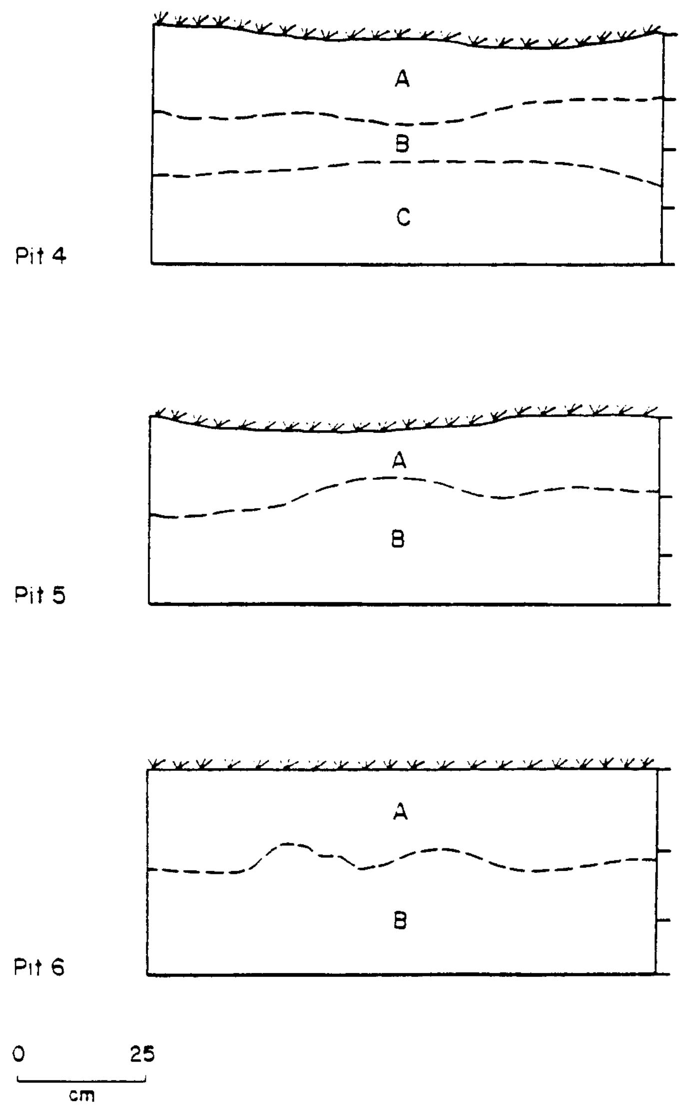


Figure 5.8. Profiles of Test Pits 4, 5, 6 at 23BE214.

The distribution of projectile points at 23BE214 is presented in Table 5.1. For comparative purposes all of Chomko's (1977) points have been reclassified using the categories devised for this report (Goldberg and Roper, Vol. II, Pts. 1). The three additional points and the reclassification of the 1975 specimens and their distribution support Chomko's conclusion that a great time depth is represented at 23BE214 but that little of the record is intact. In fact, only one projectile point, possibly a Dalton, was recovered from an undisturbed context.

Other Chipped Stone Tools

Two other categories of chipped stone artifacts were abundant at 23BE214 (Table D-5.4). Thirty-eight bifaces and biface fragments were recovered in 1975. An additional sixteen fragments and two general bifaces were found during the 1978 test excavations. Chert scrapers, which occurred in large numbers in the original investigations (19) were not so abundant in other areas of the site. In fact only four were recovered in 1978; all were from test pits 1 and 2 in the same area of the site which was tested by Chomko. The scrapers were of various shapes and all but one were unifacially flaked. Unfortunately, the morphological data on the scrapers were collected after the 1977 report. Chomko (1977) must have subsumed scrapers under his retouched flake category. Thus it is not possible now to determine the vertical distribution (plowzone vs. subsoil) of the various scraper forms. All scrapers collected in 1978 were from the plowzone.

Other chert tools from the 1975 investigations include three drills (one hafted and classified here with the projectile points because of its utility as a temporal indicator), one graver, a chert hammerstone, and a chopper. In 1978 an additional graver was recovered. It was part of a multi-purpose tool; the other portion was a unifacially flaked convex end-scraper. All of the well-made chert artifacts recovered in 1975 and 1978, with the exception of a Dalton point, were in disturbed context from either the surface or the plowzone.

Ground Stone

Two types of stone were ground for use as artifacts. The first was sandstone, ground on two of its opposing flat surfaces, for use as a mano. The other was hematite; three pieces had surfaces which were ground smooth. Four additional unaltered pieces of hematite were found in the 1978 excavations.

TABLE 5.1

Projectile Point Distribution — 23BE214

Date Recovered	Provenience	Chomko Type (1977)	New Type	Temporal Span
1975	SQ 2 - plowzone	5	332 Standlee	Late Archaic/Woodland
1975	SQ 4 - plowzone	5	332 Standlee	Late Archaic/Woodland
1975	SQ 3 - plowzone	7	374 Bifurcate base	Early Archaic
1975	SQ 4 - plowzone	7	382 Side-notched	Dalton
1975	SQ 3 - plowzone	8	375 Graham Cave	Early Archaic
1975	SQ 3 - plowzone	12	310 Corner-notched	Archaic/Woodland
1975	Surface	12	999 Unclassifiable	?
1975	SQ 3 - plowzone	12	339 Etley	Late Archaic
1975	SQ 1 - subsoil	14	350? Dalton?	Dalton
1975	Surface	17	999 Unclassifiable	?
1975	SQ 4 - plowzone	17	999 Unclassifiable	?
1975	SQ 2 - plowzone	19	999 Unclassifiable	?
1975	SQ 2 - plowzone	19	999 Unclassifiable	?
1975	SQ 1 - plowzone	20	999 Unclassifiable	?
1975	SQ 4 - plowzone	20	999 Unclassifiable	?
1975	SQ 2 - plowzone	21	314 Hafted drill	Late Archaic/Woodland
1977	Surface	-	349 Plainview	Dalton
1978	Pit 1 - plowzone	-	350 Dalton	Dalton
1978	Pit 6 - plowzone	-	377 Side-notched	Early Archaic

Debitage

Various stages in lithic procurement and reduction are represented by debris recovered during the excavations in 1978 (Table D-5.3). Thirty-three unmodified chunks and eighty pieces of raw material were present. Initial stages of tool manufacture are represented by cores and core fragments. All eight of these were recovered from the eastern portion of the site – five in 1975 and three from test pits 2 and 3, in 1978 (Table D-5.4). Initial manufacturing processes are indicated by 1,079 pieces of shatter and 23 primary and 20 secondary flakes. Tertiary flakes are the most numerous (141), with 1,561 additional flake fragments, the majority of which were probably also tertiary forms. Eighteen of the flakes were modified in some way.

While the categories used in the present analysis differ somewhat from those used by Chomko (1977), a comparison of debris classes shows a pattern similar to that formed in his initial analysis. Final stages in lithic reduction are well represented in the debitage at the site. Using only complete flakes for comparison, 76.6% of the flakes are tertiary forms. The rest are fairly evenly distributed between the primary (12.5%) and secondary (10.9%) classes. If flake fragments are assumed to represent primarily the smaller tertiary forms, the percentage of decortication flakes drops to 2.4%. The percentage of decortication flakes from the 1975 sample was similar – 4.1%.

Naturally occurring miscellaneous rock was quite abundant at the site. Almost 17,000 pieces were recovered in the six test pits.

Chert data were not collected for the majority of the lithic artifacts. Thus, it is not possible to assess the degree of chert selection by the occupants of 23BE214.

DATES

No organic material has been preserved at the site, making radiocarbon determination of site occupation impossible. However, two lithic samples were submitted for thermoluminescence dating. One of these, a piece of limestone, was not heated sufficiently prehistorically to assess its age by this means. The second sample, a piece of fire-cracked chert from test pit 1, level 02 (10-20 cm below surface), dated at less than 3,000 years B.P. (Vol. I, Appendix B). The occurrence of this flake in the same level as a Dalton point merely confirms that the archeological deposits have been mixed by agricultural practices and minimal soil deposition between occupations.

DISCUSSION

Intrasite Comparison

The vertical distribution of tools and debitage (Tables D-5.3 and D-5.4) shows that the archeological deposits are largely confined to the zone disturbed by plowing. In the four test pits where excavation continued below the plowzone, only 7.9% of the flakes and none of the tools were found in the subsoil.

The horizontal distribution of tools and debris gives an indication of relative intensity of the occupation on the three different knolls. Areas previously defined as 23BE214 and 23BE217 (Fig. 5.6) appear to have been used to a similar degree, based on the debris and tool frequencies from test pits 1, 2, 3, and 4 (Table D-5.3). By comparison the western part of the site (previously 23BE215) appears to have been used less intensively. Test Pit 6, on the top of the knoll has a much lower debris density than the eastern knolls, and test pit 5, on the slope of the knoll, contained very little debris and no tools.

If negative evidence can be accepted, there is some indication that fewer activities occurred in the western portion of the site. The only tools recovered there were bifaces – a single projectile point and three general bifaces and fragments. The eastern portion of the site contained a number of tools indicating a variety of activities as well as a higher density of debitage. The numerous projectile points and bifaces there suggest that hunting and butchering were important activities. The bifaces, scrapers, and modified flakes may indicate cutting and scraping activities associated with hide or wood processing. The chopper, drills, and gravers may have been used for processing similar materials.

Stone working appears to have been another important activity, at least in the eastern area of 23BE214; cores, hammerstones, shatter, and flakes were all present. The later stages of lithic reduction are well represented. The small number of cores and lack of preforms may indicate that initial stages were taking place elsewhere.

That some food processing was occurring is evidenced by the sandstone mano. Pigment processing was also an important activity.

Period of Occupation

The 1978 excavations helped to confirm the antiquity of the Pippins Site as tentatively suggested by Chomko (1977). A basal segment of a biface collected during the original testing was reminiscent of Dalton forms, but was too

fragmentary for positive identification. A specimen collected from the surface in 1977 gave further credence to Chomko's tentative classification since it was identified as a Plainview point, typical of occupation in the area between 9500 and 10,500 years B.P. (Kay 1978; Collins, et al. 1979). Also, in 1978 another Dalton point was recovered during excavations. At least the eastern portion of the site may have been occupied as early as 10,000 years B.P.

Other points may also represent early occupation of the Pippins Site. A large bifurcated base point (Type 374) is similar to those recovered from Early Archaic contexts in the southeastern United States and may have coexisted with the Dalton forms or date slightly later (Goldberg and Roper, Vol. II, Pt. 1). A side-notched specimen (Type 382) is reminiscent of the Hardaway Dalton form (see Coe 1964: 120) and may similarly date to before 9000 B.P. Two side-notched specimens, a Graham Cave (Type 375) and a Type 377 which may be a variant on the Graham Cave form, may also date to the Early Archaic period.

Later periods are also represented in the cultural assemblage at 23BE214. An Etley point (Type 339) suggests that the site was used sometime during the Late Archaic period. Two corner-notched forms are also present at the site — Types 310 and 314 — and do not have a firm temporal placement. They may have been used during either the Late Archaic or Woodland period (Goldberg and Roper, Vol. II, Pt. 1). Two contracting stem specimens are probably Standlee forms (Type 332) which may also span the Late Archaic and Woodland periods.

The distribution of the diagnostic forms and the absence of firm radiometric dates from the site make it difficult to assess the variability in site usage through space and time. All of the earliest forms were recovered from the eastern part of the site. However, only one projectile point was found in the western area; that the Dalton-Early Archaic period is not represented there may be simply due to sampling error. It is clear, however, that there is a great time span represented by the eastern assemblages. Unfortunately, because the site is placed on an early terrace (T-3), there is little depth to the deposits. Subsequent agricultural activity has destroyed any spatial relationships which may have originally existed between components. Thus, it is impossible to assess changing patterns of site function through time.

SUMMARY AND RECOMMENDATIONS

Further investigations at the Pippins Site have shown that it was indeed occupied as early as the Dalton period. It was, however, reoccupied sometime during the Late Archaic

or Woodland period. Cultural remains from the individual occupations have been irreparably mixed by plowing.

Site areas originally designated as 23BE215 and 23BE217 are probably parts of the Pippins Site, 23BE214. The debris scatter is continuous across the three separate knolls which which are part of the same terrace. The earliest part of the prehistoric sequence may, however, have been confined to the eastern portion of the site. Activities in the western portion are limited as evidenced by less dense debris scatter and little variability in the tool assemblage when compared to the eastern part of the site.

No further work is recommended at the site. Although it appears that there is an extensive Dalton/Early Archaic component — a period for which evidence is meager in the reservoir area — its mixture with a later component and displacement of original spatial context would make interpretation difficult at best.

Site 23SR189

BACKGROUND

The designated 23SR189 was first identified in April 1962. It was relocated during transect survey (Stage 2 Survey) in August 1976. The site is located in Butler Township, St. Clair County, approximately 1 km south of the St. Clair/Henry County line. Site 23SR189 is situated 20 m from the north bank of the Osage River, approximately 10 meters above the river and is bordered on the west by a first order intermittent stream. The site is an open site encompassing two successive terraces, T-1b and T-2 (Fig. 5.1).

Site 23SR189 covers a large area, including a large cultivated field and a grassy strip between the field and the river. Surface conditions at the time of the 1976 survey and the subsequent 1978 resurvey and excavation appeared to be relatively similar, except for a tree line paralleling the river which was removed previous to the 1978 visitation. The major area of the site was situated in the large field which had been disked and plowed but not planted. A tree line afforded a boundary for the site on the north and west. Soils for this general area are classified as Hartville-Ashton-Cedargap-Nolin association (Allgood and Persinger 1979: 39). Chert outcroppings were as follows: Jefferson City chert found along stream beds and 2 km both east and west of the site; most of the site area was located on good quality Chouteau chert; and, a poor quality Burlington occurred on the ridges to the north (Ray, Vol. II). Several hundred meters east of the site was purportedly the location

of the small river community of Baker, which flourished in the 19th century and still may appear on some maps today.

ARCHEOLOGICAL INVESTIGATIONS

In 1978 a series of investigations was begun at 23SR189, initially as part of the testing program at multicomponent sites. The original surface collection, made in 1976, included projectile points identifiable to the Dalton period through the Late Woodland period. If the cultural components were stratified in any area of the site, it would be an ideal site for yielding a chronological sequence, perhaps representative of the full time range of human occupation in the area.

In order to determine the subsurface parameters of the site, a series of shovel test holes were excavated (Fig. 5.9). Because of the large size of the site (it was estimated to cover 235,000 m^2 during initial survey), it had been subdivided into areas in 1976 to obtain representative surface samples. At that time 10 x 10 meter squares were intensively collected in eight different sections of the site. The shovel testing in 1978 approximated these areas as closely as possible with at least one test hole to a depth of 50 cm in each area. Fourteen shovel tests were dug, but only test holes 2 and 14 in area A contained cultural material below the plowzone.

Before further testing in Area A was done to examine the nature of the buried deposits, two other types of investigations were carried out. Given the site's large size and diversity and high frequency of projectile points, more intensive and systematic surface collection than that done in 1976 was called for. In that the site occurred on two separate terraces (T-1b and T-2), it was possible that occupations of separate periods were represented on each of the landforms but with little areal separation. The large site area designated as 23SR189 could potentially be two or more smaller sites, the remains of which had been mixed by natural and agricultural processes.

To test whether the surface scatter represented an areally continuous site occupied during several periods, a systematic collection of diagnostic projectile points was made. The entire field was walked at three row intervals. In each pass diagnostic artifacts were flagged and debris concentrations and discontinuities were noted. The location of each diagnostic artifact was then mapped (Fig. 5.9).

If areas were identified which contained projectile points from a single period and particularly if the debris scatter in those areas were isolated, it could be assumed that the site was horizontally stratified. If such isolates were not found, it was probably the case that the entire

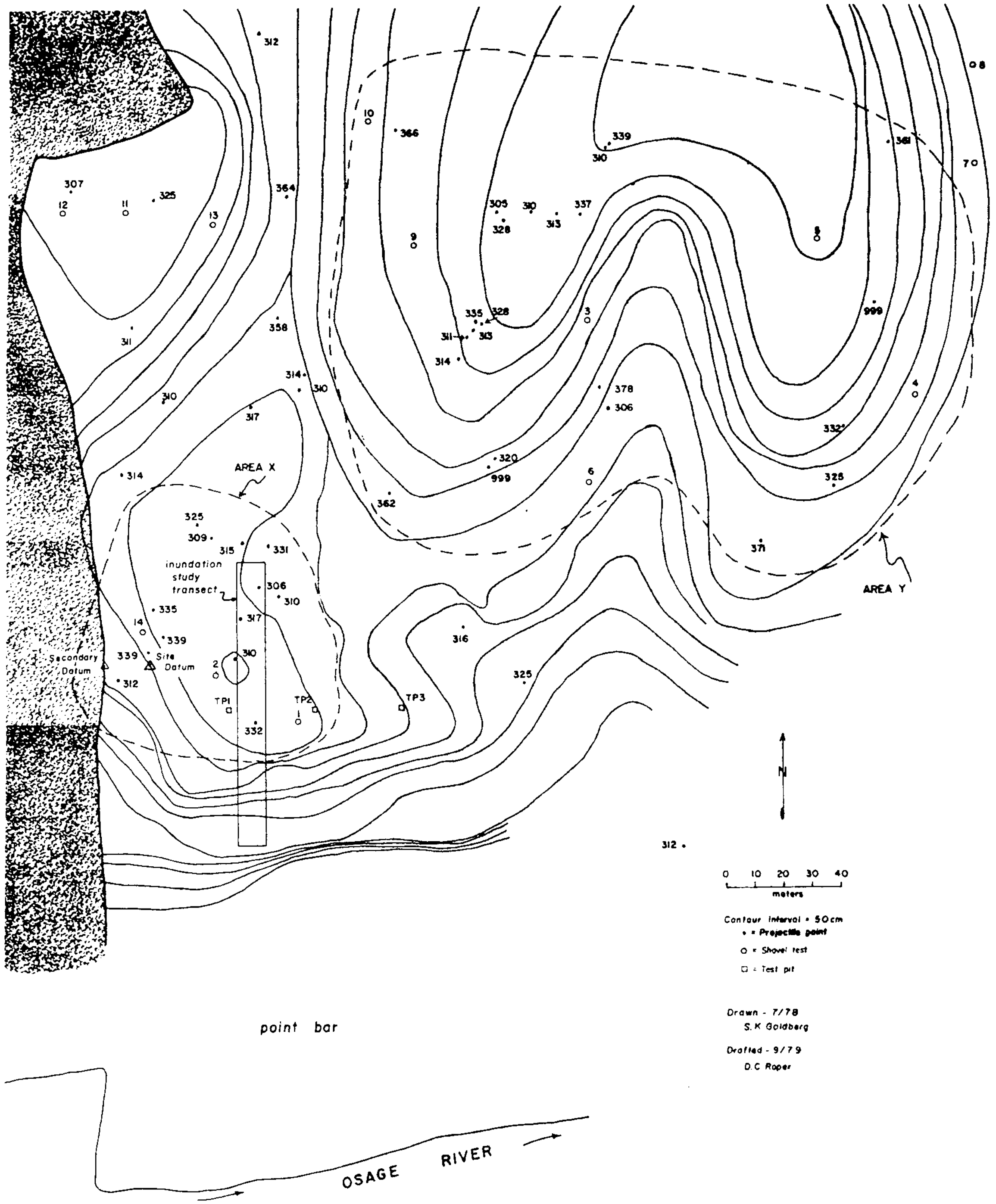


Figure 5.9. Site topographic map, showing locations of test pits, inundation study project transect, and surface collected projectile points.

site area was used during several periods. Identification of the projectile points would allow a determination of which parts of the site were occupied during which periods.

Three fairly distinct debris scatters were identified within the area originally designated 23SR189. One of these, in the extreme north farthest from the Osage River, was so spatially separated from the rest of the scatter that it was given the separate site designation of 23SR685. Identifiable projectile points from that area were predominantly from the Late Archaic period and included Etley, Afton, Gary, and Smith points as well as five other corner-notched forms.

The two other areas of fairly distinct debris concentration were designated areas X and Y. Area X, originally in the subsection A of the 1976 survey, was in the southwest section of the site on the T-1b. Farther north and east on the older terrace (T-2) was another concentration – Area Y. The debris density in gulleys between these two areas was much lower but was continuous. It could not be determined from surface evidence whether these areas represented different occupations, were concentrations of prehistoric activity, or whether the gulley had simply dissected a single occupation. On the basis of projectile point forms (Table 5.2), both areas were occupied at several times, including at least the span from the Late Woodland period to the Late Archaic period. Additionally, however, Area Y contained at least one projectile point from the Middle Archaic period and one from the Dalton period.

Results from the systematic surface collection at 23SR189 showed several things. The site was somewhat smaller than originally estimated with the northernmost part of the debris scatter being a separate site. The newly defined surface scatter covered approximately 75,000 m^2. Two areas of debris concentration were defined, but no parts of the surface assemblage could be identified as representing a single component. Both Areas X and Y are multiple component assemblages. Area Y contains material from the Dalton through the Woodland periods. Area X contained only later material on the surface. In order to determine whether the earlier components were also represented in Area X where there were intact subsurface deposits, limited testing was carried out in that location.

In addition to the systematic surface evaluation just described, another surface investigation was performed at 23SR189. In conjunction with the National Reservoir Inundation Study (Lenihan et al. 1977) to study the effects of inundation on surface distributions, a study was undertaken in the Truman Reservoir area. This site was chosen as an ideal location for this type of study, which has been described in full earlier in this volume.

TABLE 5.2

Projectile Points Located During Systematic Surface Collection at 23SR189

Area X			Area Y			23SR685			23SR189-General Area		
Type	No.	Period	Type	No.	Period	Type	No.	Period	Type	No.	Period
325	1	Woodland	305	1	Late Woodland	310	2	Late Archaic/ Woodland	307	1	Late Archaic/
309	1	Woodland	306	1	Late Archaic/ Woodland	316	1	Late Archaic/ Woodland	309	1	Woodland
315	1	Woodland	310	2	Late Archaic/ Woodland	326	1	Late Archaic	310	2	Late Archaic/ Woodland
331	1	?	311	1	Late Archaic/ Woodland	330	1	Woodland	311	1	Late Archaic/ Woodland
306	1	Late Archaic/ Woodland	313	2	Late Archaic/ Woodland	339	2	Late Archaic	312	3	Late Archaic
317	1	Woodland	314	1	?	364	3	?	314	2	?
314	1	?	320	1	Woodland				316	1	Late Archaic/ Woodland
310	1	Late Archaic/ Woodland	325	1	Woodland				317	1	Woodland
332	1	Late Archaic/ Woodland	328	2	Late Archaic/ Woodland				325	2	Woodland
339	2	Late Archaic	332	1	Late Archaic/ Woodland				339	1	Late Archaic
312	1	Late Archaic	335	1	Late Archaic				358	1	?
335	1	Late Archaic	337	1	Late Archaic				364	3	?
			339	1	Late Archaic						
			355	1	Late Archaic						
			361	1	?						
			362	1	?						
			366	1	Late Archaic/ Woodland						
			371	1	Early Archaic						
			378	1	Early Archaic						

EXCAVATION STRATEGY

When the site was resurveyed in June 1978, systematic shovel testing indicated that the area of the site containing the most depth and density of cultural material was the grassy strip paralleling the river on the T-1b – Area X. Two of the shovel tests in this area (#2 and #14) contained large numbers of flakes and debris below the plowzone (Table D-5.5). None of the other test holes had any material to that depth. Three 1 x 1 meter excavation units were opened in this area in July 1978.

Each unit was shovel-scraped in 10 cm levels and all fill was passed through a 1/4" mesh screen. Pit 1 (20S, 25E) was taken down to 80 cm below ground surface. Pit 2 (20S, 55E) was initially taken down to 41.5 cm below ground surface; the southwest corner was taken to 66.5 cm below ground surface. Pit 3 (20S, 85E) was taken down to 50 cm below ground surface; the southwest corner was taken to 70 cm below ground surface. Only the southwest quadrants of Pits 2 and 3 were continued since the cultural material was very sparse and the soil was exceedingly difficult to excavate and screen. All units were excavated to a depth at least 10 cm below the level at which no cultural material was found. All cultural material and lithic was collected and catalogued according to unit and level. Profiles of the south and west walls were drawn for each unit.

NATURAL STRATIGRAPHY

The plowzone layer (Fig. 5.10-Zone A) of all three test units consisted of a medium to dark brown silt with organic material and a depth of approximately 20 cm below ground surface. At this depth, a slight color change occurred, the soil became lighter and slightly red/orange/yellow with an addition of some clay (Fig. 5.10-Zone B). At approximately 60 cm below ground surface clay content increased; the soil became blocky and lighter still with grey and yellow mottling (Fig. 5.10-Zone C). The bottom of Pit 1 contained a very light yellow brown clayey silt with grey, orange, yellow streaks.

The matrix in Pit 2 (S20, E55), while undergoing similar transitions as those in Pits 1 and 3, was slightly darker brown in color and, below the plowzone, had a higher clay content and sticky texture. This difference may be due to modern disturbance or differential drainage patterns across the site.

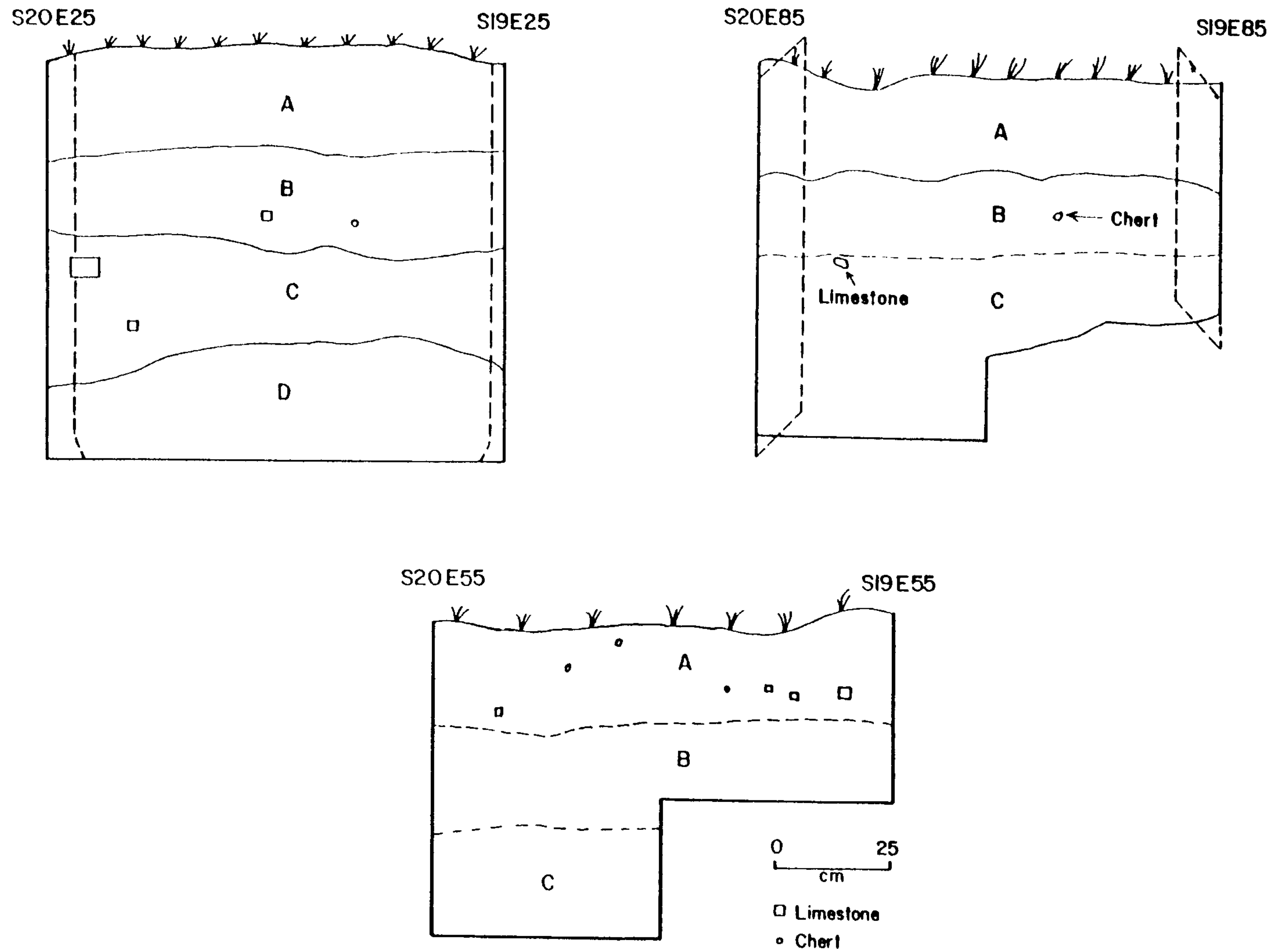


Figure 5.10. Profiles of test pits at 23SR189.

CULTURAL STRATIGRAPHY

Debris and tool distributions (Tables D-5.7 and D-5.8) from the three test squares yielded information about differential intensity of activity through the site – presumably varying through time. The best representation of the variability in debris density through the depth of the deposits is in Test Pit 1 (20S, 25E). That square has the highest density of cultural materials, as well as maximal separation of apparent components. Unfortunately, no living surfaces or features were noted, so component identification is dependent upon debris profiles. As can be seen from flake, shatter, and chunk frequencies (Table D-5.6), at least two components are distinguishable in Test Pit 1. The first, and that with the highest material density, is in the plowzone from ground surface to 31 cm. Below this in the 31 to 41 cm level density drops off before increasing again between 41 and 61 cm. While there is certainly not a sterile zone between these two components, the 31 to 41 cm level probably represents either a transitional zone with deposits from the first two components mixed together or perhaps a transitional period with somewhat less prehistoric activity at the site. Below 61 cm there is a drastic decrease in debris density with cultural material being recovered to a depth of 81 cm but in small quantity.

Test Pit 3 (20 S, 85E) appears to have a somewhat different debris density profile. Debris frequencies from that square are very similar in all of the first three levels. The upper 52 cm in this square most likely contain materials from the upper two components which were isolated in Test Pit 1. There is no separation or decreased debris density between these components as there was in the western square. Also, debris density in this square drops off much like that in Test Pit 1, but it does so at a higher level.

An explanation for the differing debris profiles in these two squares may be found in a consideration of their location relative to the creek which flows to the west of the site (just off map in Fig. 5.9). Stream transport of sediments would account for more rapid sedimentation in the western portion of the site. Such sedimentation would, in turn, account for both deeper and stratigraphically more separate cultural deposits in Test Pit 1.

The situation in Test Pit 2 (20S, 55E) is not at all similar to the other two squares. An extremely high frequency of debris, particularly flakes, was recovered from the plowzone. Below this, however, debris density decreased considerably. By a depth of 39 cm, debris was virtually nonexistent. Such a debris profile corresponds well with the anomalous soil profile in this square. Immediately below the plowzone was a stratum nearly identical to that

encountered in the other areas of the site – light yellowish brown compact sediments. Below this, however, in the 29 to 39 cm level, a dark, very sticky, wet clay was encountered.

A possible explanation for this anomalous square may be found in a story related to the excavation crew by the tenant farmer of the field, Eric Hankins. Purportedly, the area excavated in 1978, as well as the grassy strip to the north between the cultivated field and the high drop-off to the Osage River, was bulldozed 30 to 40 years ago. An unknown amount of soil was dozed off of the terrace crest and pushed downslope to the east to level the area for cultivation. More recent bulldozing during the process of clearing vegetation in preparation for inundation makes it difficult to assess the validity of Hankins' information. Extensive bulldozing and redeposition might explain the deposits and low debris density in Test Pit 2, however.

THE COLLECTIONS

Ceramics

A single pottery sherd was recovered during the many phases of archeological investigations at 23SR189. It was found in the plowzone of Test Pit 2.

Lithics

Tools

The largest sample of tools from 23SR189 was recovered from two surface investigations; a general collection was made during the original survey in 1976 and a more controlled collection, discussed earlier, in 1978. As the spatial provenience of the original collection was minimal, it is necessary to describe those specimens as being generally from 23SR189. Assignment of individual specimens to particular areas X and Y of the site as used subsequently is not possible.

In addition to the projectile point sample described earlier, three specimens from the initial survey were assignable to stylistic categories – Dalton, Big Sandy and Category 31 (subsequently renamed Truman Broadblade). The Dalton point, which probably represents the earliest occupation at the site, is similar in form to those classified as Hardaway Dalton (Category 384). The other two specimens indicate, as did the 1978 projectile point collection, that the site was occupied during several periods and as late as the Woodland period.

A large quantity and range of other tool forms were recovered from the surface in 1976 and 1978. The most numerous of these were bifaces. Only nine of them were complete specimens – one each of triangular, circular and rectangular forms, as well as six generalized forms. Eighty biface fragments were found on the surface; ten were pointed, eight were square, nineteen were rounded, and four were irregular in form. None of the other thirty-nine were complete enough to identify their original shape. Another form of cutting implement was recovered – three blade flakes.

Scraping implements made up the next largest class of tools from the surface. They were of a variety of shapes, but all scrapers were unifacially flaked. Of the thirty-two scrapers, nine were of a generalized form, eight were irregular, six were straight, five were convex, two were concave, and the other two included spokeshaves.

Other lithic artifacts included four punching or drilling implements – two drills, a perforator and a graver. Additionally, two cleavers, a piece of hematite, and a single piece of groundstone were collected from the surface.

The only debris recovered during surface collections was in the form of cores; twenty-nine were collected. It appears that a fairly advanced lithic reduction technology was known to the occupants of the site. Eight of the cores had prepared platforms, and one of those as well as another from excavated context exhibited very well executed parallel flaking with uniform flake scars.

Tools recovered during the test excavations in Area X were not so numerous as in the surface collection. Given the small size of those test units (1 x 1 m), however, tool density was relatively high. The majority of the tools (61%) came from the plowzone (Table D-5.7). All three excavated projectile points were from the plowzone; two were too fragmentary to classify and the third was a small Big Sandy form (Category 378), presumably dating from the Early Archaic period.

The other tool forms in the excavated sample were very similar to those found across the site's surface, although less of a variety was represented. As on the surface, the most numerous of tools were broken bifaces – nineteen in all. One of these was pointed and another was rounded; but the rest were too incomplete to determine morphology. Also well represented were unifacial scrapers; irregular, straight, convex, and generalized forms were found. Six cores, a cleaver, a blade flake, and a piece of hematite duplicated forms found on the surface. Additionally, though, a chert hammerstone was recovered.

Debris

A large number of miscellaneous limestone and sandstone pieces, as well as chert chunks and shatter, were excavated from the three test squares (Table D-5.6). Both the chert and other material may have been transported to the site by its inhabitants, although it is possible that some was stream or river deposited. Human transport may be the most likely of the two possible sources for two reasons. First, the quantity of material through different levels corresponds fairly well with the density profile of culturally produced flakes. Second, much of the miscellaneous rock has been firecracked and may have been used in hearths or for stone boiling.

Culturally produced chert debris is primarily in the form of flake fragments. Almost 95% (4,050) of the flakes recovered were broken. Of the 216 complete flakes, 3.2% were primary, 5.6% secondary, 82.4% tertiary and 7.4% bifacial trim flakes. Only eighteen (8.3%) flakes were modified by either battering or utilization.

It seems apparent, given the number of cores at the site and the refined technology which some of them exhibit, that primary lithic reduction was an important activity at the site. Final reduction, tool production and perhaps maintenance were also performed. The percentage of tertiary flakes (82.4) is somewhat lower than their relative occurrence at many other sites (usually 90% or more), which may indicate the relative importance of initial reduction at 23SR189. Given the number of broken flakes, however, such a statement has little support.

Chert Utilization

In analyses on chert availability, quality, and procurement, Ray (Vol. II) predicted that the distribution of chert types in the 23SR189 assemblages would be 20% each, Burlington and Jefferson City and 60% Chouteau. The only chert from 23SR189 which was consistently identified during the lithic analysis was that from the shovel test holes and the projectile points collected from the surface. Those identifications (Table D-5.8) are used to compare chert selection to the predicted chert availability. It can be seen that in both the debris and points Jefferson City is extremely over-represented, while Chouteau is under-represented. Burlington is only slightly under-represented. Other types which were not locally available (Gasconade, Roubidoux, and types exotic to the reservoir area) made up 14.7% of the identifiable shovel test debris. It can be concluded that the inhabitants of 23SR189 were not using chert in direct proportion to its availability. The utilization of Jefferson City chert at the expense of Chouteau may be explained by

the quality of the nearby sources (see Ray, Vol. II for discussion). The presence of other cherts can only be explained by a departure from the least-effort hypothesis advanced by Ray.

THERMOLUMINESCENCE DATES

Four samples from 23SR189 were submitted for thermoluminescence dating. They were chosen from Test Pit 1 (20S 25E) which had the best separation of components. As no living surfaces or features were detected at the site, samples were chosen from general midden deposits. The results are as follows:

21 to 31 cm – no date obtainable
31 to 41 cm – A.D. 20 ± 200
41 to 51 cm – 1100 B.C. ± 300
51 to 61 cm – 2000 B.C. ± 400

Dr. Ralph Rowlett, director of the Thermoluminescence Laboratory, indicates that these were consistent and probably reliable dates. The implications of these results are discussed below.

INTRASITE COMPARISON AND DISCUSSION

The vertical distribution of debris and tools was discussed in the section on cultural stratigraphy. From artifact profiles it appears that the best record of temporal changes at the site is found in Test Pit 1, closest to the secondary stream. The thermoluminescence dates obtained from that excavation unit allow some conclusions to be made about the history of the occupation at the site. On the basis of the debris distribution, it appeared that occupation occurred at least two times. There is a debris frequency peak in the plowzone and another between 41 and 61 cm. Between the two there is slightly decreased debris density. The peak in debris between 41 and 61 cm, however, appears to represent activity at the site during at least two different times, almost a thousand years apart. It is likely that the site was used repeatedly between those 2000 B.C. and 1100 B.C. markers. The excavation techniques were not refined enough nor was the sample of thermoluminescence dates large enough to confirm that there was repeated, or even perhaps continuous, occupation.

The level of diminished debris density, between 31 and 41 cm, was thought to represent either decreased activity at the site between more major occupations or perhaps mixing of remains from those major occupations. A date of A.D. 20±200 was obtained from that level. In the absence of a radiometric date on the component in the plowzone

thought to represent the last occupation of the site, it is difficult to assess the relationship of the materials in the 31 to 41 cm level to those in the plowzone. One tiny bit of evidence – a pottery sherd from Test Pit 2 in the plowzone – might indicate that this latest occupation was somewhat later than the A.D. 20 date. Projectile points from the surface would support the conclusion that the site was occupied during the Late Woodland period. If that is the case, it would appear that occupation occurred at least four separate times.

The earliest occupation in this area of the site is impossible to determine from the present data. No diagnostic materials were recovered in situ and there were no radiometrically datable materials recovered from the lowest excavation levels. The earliest diagnostic artifacts from the surface were the Etley (Category 339) and Sedalia (Category 335) forms which may be represented by the assemblages dated at 2000 B.C.$\pm$400. Some cultural material, including a scraper, was recovered up to 30 cm below that component and may represent an earlier occupation.

Any changes in site function that may have occurred through time are unknown; testing was at too small a scale and the number of tools recovered from each component was minimal. Scraping, cutting, and initial lithic reduction may have been important during all periods. Vegetal processing was probably minimal as evidenced by the nearly total absence of groundstone implements throughout the site. Beyond these basic statements, however, very few data are available to determine site function.

Some indication of differential activity across the site is seen in a comparison of debris densities from the two test squares which were undisturbed. Test Pit 1, which was closest to the secondary stream, contained far more tools and debitage than did Test Pit 3, 60 meters to the east. The variability in actual density of materials between the two squares must be explained in terms of differential activity across the site. If aggradation of sediments was occurring more rapidly in Test Pit 1, all things being equal (i.e., similar activity and disposal rates), we would expect debris <u>density</u> to be lower in Test Pit 1. As this is clearly not the case, it must be assumed that activity in the western portion of the site was more intense than that in the area farther from the creek.

RECOMMENDATIONS

It is recommended that further investigations of two types be carried out at 23SR189 – more extensive excavation and surface monitoring. Testing in Area X at the site has shown that there has been intensive use of the area for at

least 4000 years. Surface indicators extend that human activity back to 10,000 years ago. The site contains one of the largest assemblages of Archaic material in the reservoir area, in addition to the great time depth it represents. Moreover, in the area on the western edge of the site, cross-cut by Test Pit 1, it appears that at least 4,000 years of the archeological record is intact and stratified. Further testing, particularly in that area, would allow recovery of a larger sample of tools and analysis of patterning in the various occupation levels. Only through such additional work will the relationship of the components and changes in site function become clear. Further testing may also permit collection of materials from the earliest levels of the site which are potentially datable. It is possible that the Middle Archaic and Dalton period occupations represented by surface materials in other areas of the site may also be represented at the bottom of the stratigraphic sequence in Area X.

The other type of work which needs to be continued at 23SR189 is surface monitoring in the area previously used for the inundation studies (Vol. I, Pt. IIC). Continuous shore-line agitation could have great effects on a site like 23SR189 which straddles the permanent pool elevation. Unfortunately, the most intact portion of the site promises to be the most affected by such wave action. Continued monitoring at the site will supply data to study the water's effects and allow protective action to be taken should it be necessary.

Site 23SR681

LOCATION AND SPECIFIC ENVIRONMENT

Site 23SR681 was first identified during Stage 3 survey in July 1978. The site is located in Jackson Township, St. Clair County, approximately 2 km from the St. Clair/Henry County line (Fig. 5.1). Situated on the east bank of the Osage River, an area including the south end of the site had been bulldozed by the Corps just previous to the survey team's visitation. They also noted a possible borrow area on the northeast boundary of the site. The Corps had constructed a new highway bridge across the Osage River at this point so there was a possibility that the whole area had been bulldozed at one time, although the only apparent evidence of this was the newly cleared area on the western and southern slopes and part of the southern area of the site. The northern area of the site and the area to the east of the site consisted of an unplowed field covered with grass.

Site 23SR681 is an open site located on a T-1b approximately 20 meters from the terrace edge of the river and 20

feet above the river (Fig. 5.11). A creek bounds the southern edge about 20 meters downslope of the site. The soils in this general area are classified as the Hartville-Ashton-Cedargap-Nolin association (Allgood and Persinger 1979: 39). The site is located on or very close to outcrops of Jefferson City chert, with Chouteau to the west across the river and Burlington on the high ridges to the south (Ray, Vol. II).

As a result of the recent bulldozing, visibility in the south area of the site was extremely good; visibility in the northern end of the site was fair. Several diagnostic artifacts were collected and an abundance of other nondiagnostic cultural material was observed, with a marked concentration in the southern area of the site. Several shovel tests were dug to determine the depth of the site, which appeared to be at least 25 cm.

In August 1978, an excavation team returned to the site. It was decided that since there was visible bulldozer disturbance at the southern end, a better representation of the site and its depth would result from excavating at the northern end, even though artifact density seemed to be lower.

EXCAVATION STRATEGY

Two 1 x 1 meter units were opened in the area described above. Each unit was shovel-scraped in levels of 10 cm. All fill was passed through 1/4 inch mesh screen. Pit 1 (60S, 00W) was taken down to 40 cm below ground surface. Pit 2 (120S, 00W) was taken down to 40 cm below ground surface. Both pits were excavated to a depth of at least 10 cm below the level at which no cultural material was found. All cultural material and lithics were collected and catalogued according to pit and level. Profiles of the south and west walls were drawn for each pit.

STRATIGRAPHY

The soil at this site appeared in two distinct layers (Fig. 5.12). The uppermost layer was plowzone and described as a loose, richly organic, dark brown moist, silt loam fairly uniform in color and texture. Root and earthworm action was extensive in this layer which ended at a depth of between 15 and 25 cm below ground surface. Most of the cultural material was found in this layer. The bottom layer was more compact, drier, somewhat lighter brown silt with a slight clay content. Some mottling was apparent, accompanied by manganese concretions. A small amount of gravel and some cultural material were found in this layer.

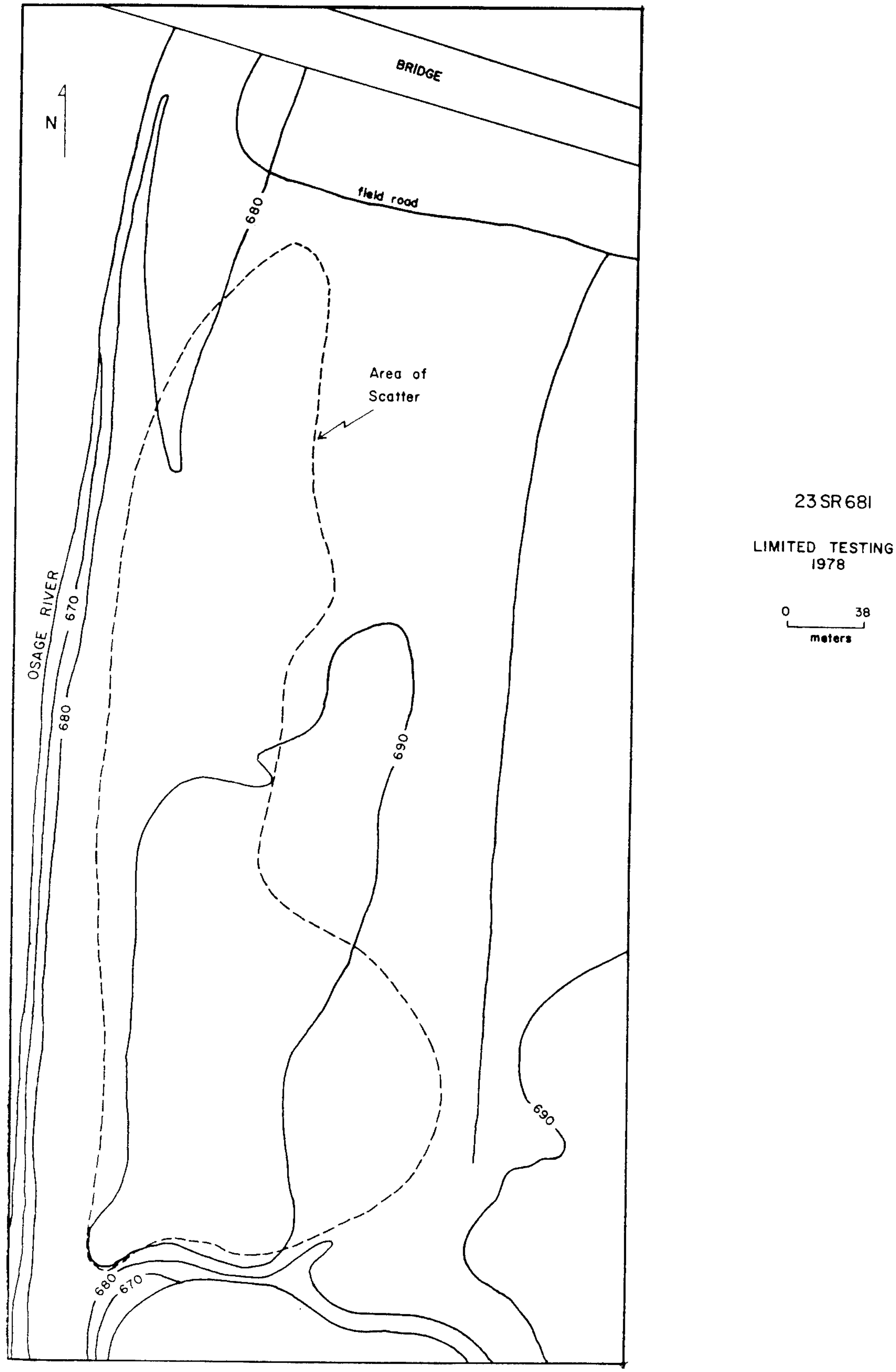


Figure 5.11. Site map, 23SR681.

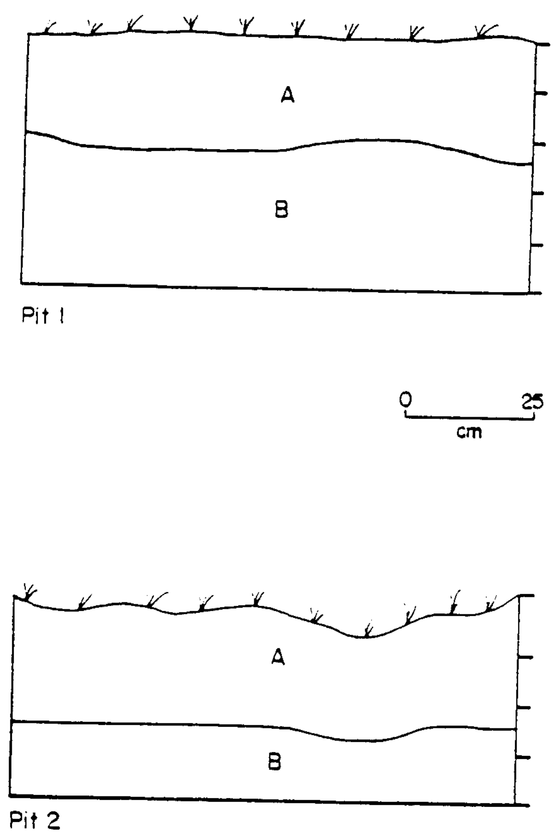


Figure 5.12. Profiles of test pits at 23SR681.

THE COLLECTIONS

An extremely small amount of cultural material was recovered from Site 23SR681, particularly from the northern part of the site. Only thirty-one lithics were recovered during the excavations in that area, and most of those were miscellaneous geologic rock (see Table D-5.9). The rest appears to represent the initial stages of lithic reduction; five chunks, two pieces of shatter, one core, and three flake fragments were found. No well made tools were recovered from either test pit.

The surface collections yielded somewhat more information about cultural context. In addition to a point from a biface and a generalized unifacial scraper, three projectile points were found on the surface. Those were Woodland forms – a Rice Side-Notched (Type 325), a Snyders (Type 317), and a small corner-notched point (Type 310).

SUMMARY AND CONCLUSIONS

Little information about Site 23SR681 was gained from the excavations except about the nature of the deposits. It was determined that the northern end of the site was either away from the most concentrated occupation or that depositional processes resulted in very shallow deposits there. Further excavation in the southern end of the site where debris is most concentrated and cultural material extends below the plowzone would be futile. Earth-moving activities there have totally disturbed the deposits.

Based on the small collection of cultural material from the site, little can be said about its placement in the settlement system. From the three projectile points recovered from the surface it would appear that the site was occupied at least during the Woodland period and may be similar to sites such as 23BE681, which contained a similar projectile point inventory. The function of the site remains unclear.

Site 23SR675

LOCATION AND SPECIFIC ENVIRONMENTAL SETTING

Site 23SR675 was discovered during the 1978 backhoe survey for buried sites (see Joyer, Vol. I). Situated in Jackson Township, St. Clair County, it is located on the east bank of the Osage River approximately 1 km upstream of Horseshoe Bend (Fig. 5.16). Site 23SR675 is a buried site on a T-1b in the Osage River Valley.

Evidence of this site was exposed in four backhoe trenches. The first three (Holes 20, 21, 22) were placed

110 meters apart; the fourth, Hole 31, was placed equidistant between Holes 20 and 21. These trenches were roughly 200 meters east of the Osage River and approximately 50 meters southwest of a deep cut which flows into the Osage River about 500 meters to the north of the site. Holes 20 and 31 were opened in a slightly marshy area (Fig. 5.13).

Surface vegetation surrounding the site consisted of grasses, cockleburs and old cornstalks. A tree line had just been removed from the river's edge. The soils of this general area are classified within the Hartville-Ashton-Cedargap-Nolin association (Allgood and Persinger 1979). The site is situated near notably good quality outcrops of Jefferson City chert, with notably good quality Chouteau and fair Burlington outcrops about 1 km northeast of the site (Ray, Vol. II).

EXCAVATION STRATEGY – 1978

During the course of the backhoe survey, it was apparent that the cultural material of Site 23SR675 was quite dense, retained a high degree of integrity, and showed promise of botanical and faunal preservation. Additionally, tool density – particularly of projectile points – was high. Given the depth of the deposits above the cultural material, it was postulated that the remains would date from a period much earlier than that represented by Woodland materials from the surface. Thus further exposure and testing of the deposits were undertaken.

Since the midden was densest between Holes 20 and 31 and because of the relative consistency in soil stratigraphy between these two trenches, four additional backhoe trenches were placed between Holes 20 and 31 to expose the midden; three trenches were large enough to accommodate 2 x 2 meter excavation units (Pits 1, 2, and 3); one was large enough for a 1 x 1 unit (Pit 4) (Fig. 5.13). Each unit was excavated in 10 cm levels. Pit 1 was trenched to 1.63 m below ground surface and shovel-scraped to a depth of 2.75 m below ground surface. Pit 2 was trenched to 1.65 m below ground surface and shovel scraped to a depth of 2.45 m below ground surface. Pit 3 was trenched to 1.60 m below ground surface and troweled to a depth of 2.16 m below ground surface. Pit 4 was trenched to 1.55 m below ground surface and shovel-scraped to a depth of 2.46 m below ground surface. All pits were excavated to a depth at least 10 cm below the level at which no cultural material was found. All cultural and lithic material was collected and catalogued according to pit and level. Profiles of the west and south walls were drawn for Pits 1, 3, and 4.

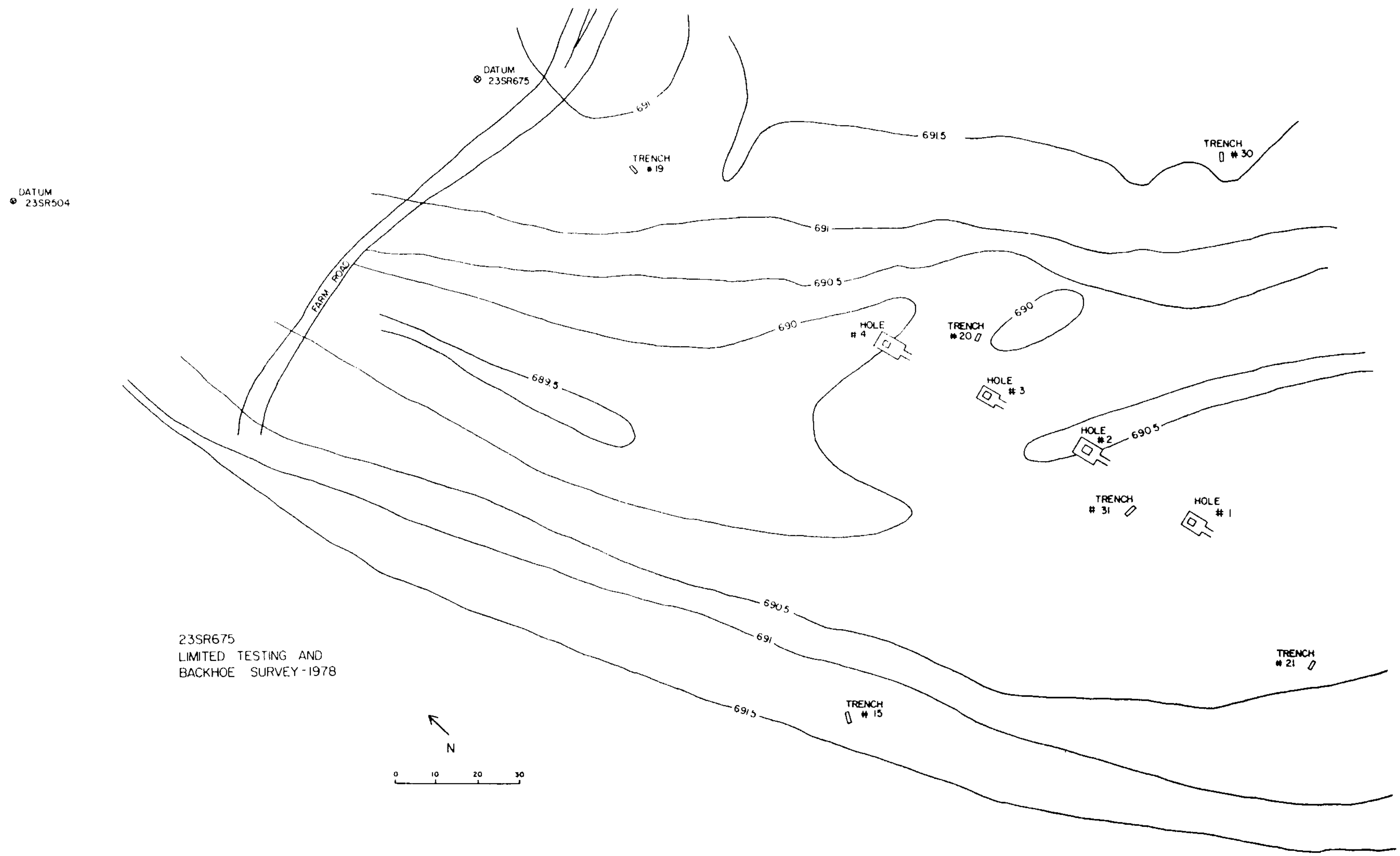


Figure 5.13. Location of backhoe trenches and excavation units at 23SR675.

STRATIGRAPHY - 1978 Backhoe Survey

Hole 20 was trenched to a depth of 3.97 m. The soil beneath the plowzone appeared greyish in color with orange mottling which gradually became redder as depth increased. Cultural material began at approximately 1.75 m below ground surface and continued to 2.00 m below ground surface. The soil for this cultural level was a very dark grey with a blocky structure, white mottling, coarse iron inclusions and charcoal. It is described as an unusual Rodgers Alluvium. The unusual aspect of iron inclusions and color is possibly due to a moist atmosphere which may have developed in the depression. The texture of this soil was typical of Rodgers Alluvium.

Hole 21 was trenched to a depth of 3.50 m. Three soil layers were described below the plowzone. The first layer, at a depth of .35 to .65 m below ground surface, consisted of a uniform brown silty clay containing iron deposits. Layer 2, at between .65 and 1.50 m below ground surface, consisted of a mottled silty clay which was greyish in color. This layer contained the cultural material, burnt earth and limonite at a depth of .82 below ground surface. The bottom layer of this trench, 1.50 m below ground surface to the bottom, consisted of a clayey mottled soil, grey, orange and brown in color with flecks of manganese.

Hole 22 was trenched to 3.74 m below ground surface. The general profile for this trench below the plowzone consisted of a loamy clay with grey mottling and charcoal flecks throughout. Cultural material began at .60 m below ground surface, however, the intense concentration began at 1.32 m and continued through 2.36 m below ground surface. Burnt earth, bone, and charcoal were concentrated at this depth. Beneath 2.36 m below ground surface, the grey mottling continued; however, the charcoal decreased to nothing at the depth of 3.00 m below ground surface.

Hole 31 was trenched to 3.90 m below ground surface. The general profile for this trench below the plowzone consisted of a loamy soil, which was reddish with grey mottling, gradually becoming more clayey by a depth of 1.75 m below ground surface. Cultural material began at .95 m below ground surface, however, concentrating between 1.75 m and 2.00 m below ground surface. Charcoal began to accumulate at 1.25 m below ground surface; a small amount of white sandstone was found at 2.00 m below ground surface.

STRATIGRAPHY - 1978 CONTROLLED MIDDEN EXCAVATIONS

Pit 1

Soil in Pit 1 seemed to be fairly uniform throughout and is described as a dark brown silty clay with grey and

yellow mottling (Fig. 5.14). The mottling in this pit and in Pit 4 closely resembled root action (Pit 4 even contained a quantity of decomposing roots). A circular yellow stain appeared in the center of the pit at 1.83 m below ground surface and continued to 2.13 m below ground surface. A large piece of charcoal was found at 2.13 below ground surface and a small concentration of white sand was found in the southwest corner at 2.33 cm below ground surface. Culturally modified lithics were found in two levels between 2.13 m and 2.23 m and continuing between 2.33 m and 2.43 m below ground surface. A small concentration of flakes associated with charcoal flecks and possible ash spotting occurred between the 2.33 and 2.43 m below ground surface depth.

Pit 2

Soil in Pit 2 was also fairly uniform and was described as dark brown to reddish brown (10YR3/3, 10YR4/3) silty clay with orange, black and grey mottling. The only lithics recovered were three miscellaneous rocks between 1.95 m and 2.05 m below ground surface. Between 2.25 and 2.40 m below ground surface, there appeared to be a cultural layer. Charcoal, described as burnt wood and bone pieces, accompanied a slight change in soil color (10YR4/3). There were no lithics found at this level, however. After 2.35 m below ground surface, there was a sharp decrease in burnt wood and bone.

Pit 3

Pit 3 contained the densest cultural material at the site. The soil was described as a dark brown silty clay with orange mottling and organic matter. Throughout a depth of 1.60 to 2.06 m below ground surface, there appeared to be a concentration of bone pieces, charcoal, burnt earth, burnt sandstone, ashy deposits, (5 cm in diameter and 3 cm in depth) and burnt clay (Fig. 5.15). Diagnostic artifacts as well as other lithic material were concentrated between 1.60 m and 1.86 m below ground surface. There was then a sharp decrease in all cultural materials until nothing appeared by 2.16 m below ground surface.

Pit 4

The soil in Pit 4 was described as a dark brown to reddish brown silty clay with lighter brown and grey mottling. The mottling appeared to be the result of a great amount of root action present throughout the pit, evidenced by the presence of decomposing roots seen in the levels and the walls of the excavation (Fig. 5.14). Very little lithic material was found in this pit. Single flakes were recovered from between 1.76 m and 1.86 m and between 2.06 m and 2.16 m

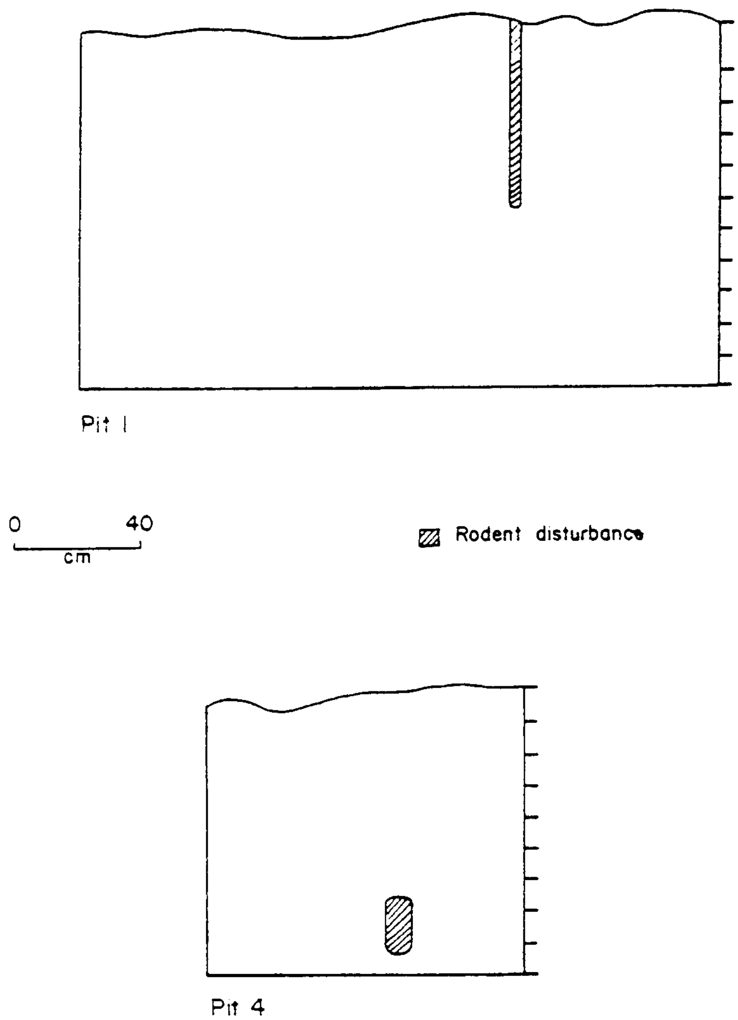


Figure 5.14. Profiles of Test Pits 1 and 4 at 23SR675.

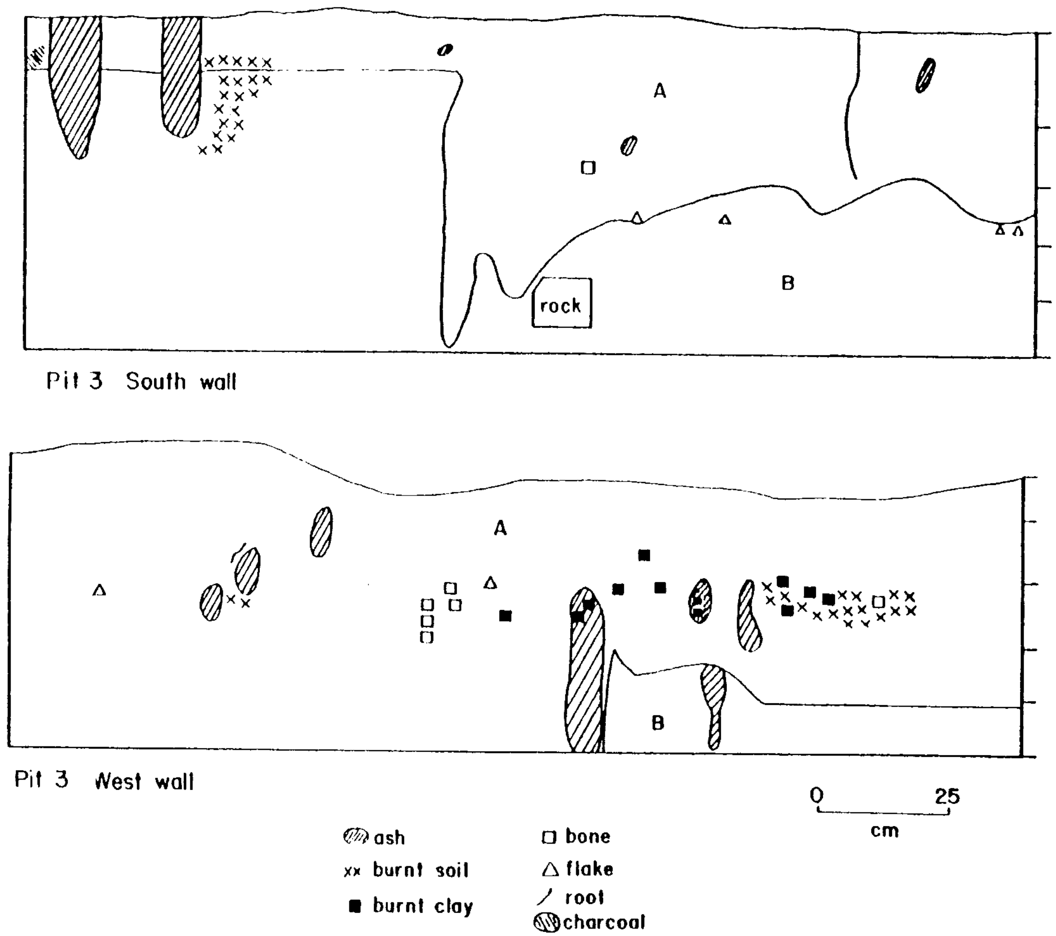


Figure 5.15. Profiles of Test Pit 3 at 23SR675.

below the ground surface. Beginning at 1.86 m below ground surface and continuing to 2.30 m below ground surface, the excavators noted a concentration of charcoal, bone and burnt earth — designated Feature 1. As no cultural materials were associated with the feature, it appears that it may have been the result of modern burning.

THE COLLECTIONS

Lithic Tools

Chert tools were recovered only from Pit 3 of the controlled excavations and from the two backhoe trenches on the site (Table D-5.10). The majority of the nineteen tools were bifaces. Seven of the fifteen bifacially worked tools were projectile points; all were remarkably similar in style and technology. Three of these Category 355 points were recovered from a single unit level in Pit 3 — the level which contained an obvious living surface with chipping debris, ash, charcoal, and burnt clay. The seven points are unlike any previously known type from the reservoir area, although their "bottle-neck" haft morphology resembles Table Rock Stemmed forms. The ninth projectile point was too fragmentary to be identified. Other bifacial tools include one circular and three general forms with two other fragments.

Unifacially flaked tools include two straight edged scrapers. Additionally a burin and a multipurpose tool (incorporating both a scraper and a graver) were found.

Lithic Debitage

Chert debitage was particularly sparse at this site with the exception of Pit 3 and backhoe trench 20 (Table D-5.11). From Pits 1, 2 and 4 a total of four chunks, one piece of shatter, nine miscellaneous rocks, and nine flakes were recovered. Only one flake was secondary; the rest were tertiary.

Debris densities were far higher in Pit 3, particularly at the 1.60 m to 1.86 m level. Twelve chunks, 195 pieces of shatter and 42 miscellaneous rocks came from those two excavation levels. Flakes, which accounted for the majority of the debris in the unit, were of several types and included two primary, 27 secondary, 503 tertiary and 25 trim flakes. Twenty-five of those flakes had been modified by crushing, battering or utilization.

The types of chert represented in the artifact assemblage (Table D-5.12) are somewhat more varied than those expected from within a 1 km radius of the site. Ray (Vol. II) hypothesized that cultural selection would approximate the

natural distribution of chert as follows: Burlington 5%, Chouteau 20%, and Jefferson City 75%. Using the distribution of chert types recovered from all test units and levels, it is shown that Jefferson City (87.6%) is heavily over-represented in the assemblage at 23SR675. Burlington (1.3%) and Chouteau (2.6%) are clearly under-represented while the presence of both Warsaw (3.0%) and Roubidoux (5.6%) indicates that cherts not locally available were being used. A goodness-of-fit test, resulting in a chi-square value of 49.20 suggests that such a discrepancy between the available chert and those types chosen for use could have occurred by chance less than one time in a thousand. The overabundance of Jefferson City chert may be a product of its high quality or "knappability," but further work will be required to make such judgments.

DATING

Two samples from 23SR675 were submitted for chronometric dating by the thermoluminescence technique. Both came from between 176 and 186 cm on the apparent living surface in Pit 3. The first, a piece of limestone, had evidently been exposed to some source of ultra-violet light and was not datable. The second, a piece of chert, was dated to 2222± 391 B.C. There was some problem with the background radiation reading (see Vol. I, Appendix B for details), but a radiocarbon date from the site gives credence to the thermoluminescence result. A sample from between 1.86 and 2.30 cm in Feature 1 in Pit 4 yielded a radiocarbon date of 3640 B.P. ±790 (DIC-1912) or between 900 B.C. and 2480 B.C. The radiocarbon laboratory in fact considered this date unreliable (I. Stehli, personal communication), however, the thermoluminescence date clearly falls within one standard deviation.

DISCUSSION AND RECOMMENDATIONS

It was apparent from the results of the test excavations at 23SR675 that there is at least one component there buried under almost two meters of sediment. This component, which dates to the later part of the Late Archaic period, is represented well only in isolated areas. Backhoe hole 20 and Pit 3 gave clear evidence of the occupation. In other areas of the site the occupation was evident but was far more ephemeral.

Below the living surface represented by burning activity, projectile points and other tools, as well as two radiometric dates, there is some evidence of another component with two tools and light debris density. There is some possibility that this material is the result of pedoturbation.

Because only a small area of the site was excavated and a small sample obtained, it is difficult to evaluate the structure or function of the site. The remains in Pit 3, while quite dense and well preserved, are probably the result of a fairly unique activity area. Other parts of the site contained merely light debris scatters.

The presence of a large number of bifaces, particularly projectile points, indicates that hunting and butchering were major activities at the site. The other tools – scrapers and pointed tools – probably reflect butchering activity as well.

Lithic tool manufacture may have assumed some part of the activity at the site. However, only one core and two primary flakes were recovered, indicating a lack of initial chert reduction at the site. On the other hand, a great many tertiary flakes were recovered, indicating that final stages of reduction probably occurred with some frequency. A relatively large number of trimming flakes indicate that tool maintenance was important.

This site appears to be important in the sense that it represents a previously unknown node in the Late Archaic settlement system. The tool assemblage has a very small range of variability and the projectile point style is unique. Furthermore, the deposits appear to have integrity with the presence of debris concentrations and features. This is probably due to the fact that it is so deeply buried. Chances are good that there are other similar sites in the reservoir which are also buried and inaccessible. While 23SR675 is important in its uniqueness and further excavation could certainly help to place it within the larger Late Archaic system, the fact that it is buried enhances its chances of survival under the reservoir waters.

References Cited

Allgood, Ferris P. and Ival D. Persinger
1979 Missouri general soil map and soil association descriptions. U.S. Department of Agriculture, Soil Conservation Service State Office, Columbia, Missouri.

Chomko, Stephen A.
1977 Cultural Resources Survey, Harry S. Truman Dam and Reservoir project, Vol. VII: archeological test excavations: 1975. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Coe, Joffre L.
1964 The formative cultures of the Carolina Piedmont. Transactions of the American Philosophical Society 54(5)

Collins, C. D., A. A. Danielsons, and J. A. Donohue
1979 The Downstream Stockton study: investigations at the Montgomery Site, 23CE261. Report to the U.S. Army, Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Johnson, Donald L.
1977 Soils and soil-geomorphic investigations in the lower Pomme de Terre valley. In Cultural Resources survey, Harry S. Truman Dam and Reservoir Project, Vol. X: environmental study papers, pp. 59-139. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Kay, Marvin, editor
1978 Holocene adaptations within the lower Pomme de Terre River valley, Missouri. Report to the U.S. Army Corps of Engineers, Kansas City District. Illinois State Museum Society.

Lenihan, Daniel J., et al.
1977 The preliminary report of the National Reservoir Inundation Study. U.S. Department of the Interior, National Park Service. Southwest Cultural Resources Center, Santa Fe, New Mexico.

Noel-Hume, Ivor P.
1969 Historical archaeology. Knopf, New York

Wood, W. Raymond and R. Bruce McMillan
1976 Prehistoric man and his environments: a case study in the Ozark Highland. Academic Press, New York.

PART III

CHAPTER 6

THE 1979 TEST EXCAVATIONS

by

Susan K. Goldberg

23BE472 – LOS PEDROS SITE

Location and Background

The Los Pedros Site, 23BE472, was located in November, 1975 during the Stage 1 reconnaissance of the Cultural Resources Survey. The site is within the South Pomme Public Use Area slated for future development. It is in Fristoe Township, Benton County, approximately 1.2 kilometers northeast of the Spring Creek Church. At an elevation of between 760' and 780' MSL, the site extends all across an upland plain which is south and 800 meters west of the Pomme de Terre River (Fig. 6.1). Soils in the general area are in the Lebanon-Goss-Bardley-Peridge association of Ozark soils (Allgood and Persinger 1979). The soil on the upland ridge where 23BE472 is located is extremely gravelly, with bedrock presumably very close to the surface. Chert available in the general area, as indicated by Ray's (Vol. II) chert mapping study around Rodger's Shelter, 23BE125, approximately 1 kilometer to the north of 23BE472, was predominately Jefferson City (80%) with small amounts of Chouteau and Burlington (10% each).

The Los Pedros Site has been surveyed during several different phases of the archeological investigations in the area. When first located in 1975, the weather and ground cover (planted in milo) did not permit an accurate assessment of the site size; it was then estimated at 50 acres. Despite the dense ground cover, large numbers of tools and much debris were collected at that time. It was clear that the site had a high artifact density and represented multiple occupations, including Late Archaic and Woodland period occupations.

In April, 1976, the site was resurveyed, under more favorable conditions, to determine its extent. The field, at that time, was fallow and had been rained on heavily. It was determined that the site was largely confined to the top of the ridge but covered all branches of that ridge and was 56,000 square meters in size (Fig. 6.2). Once again, a large collection of tools and debris was made from the surface.

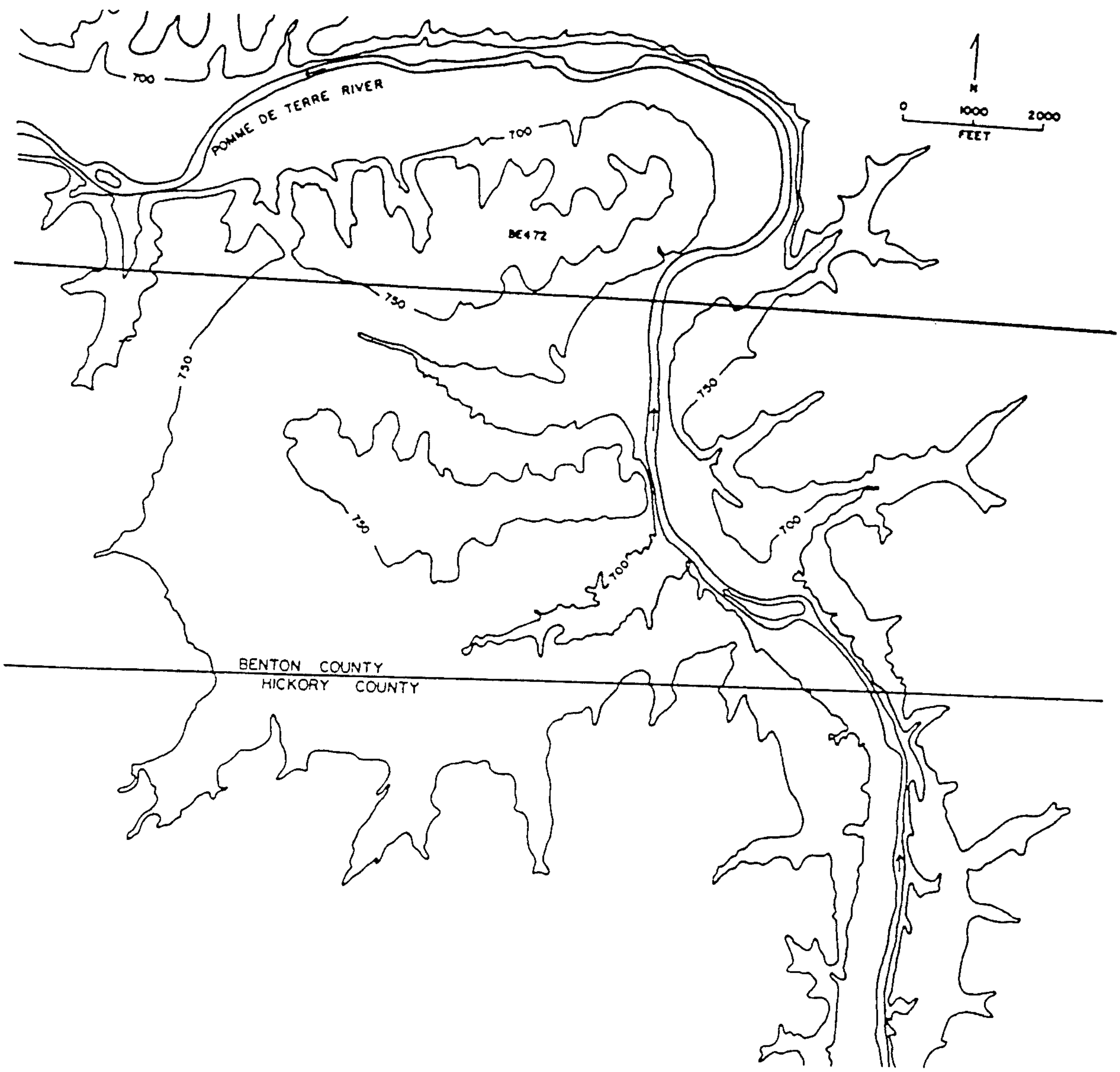


Figure 6.1. General Location of 23BE472.

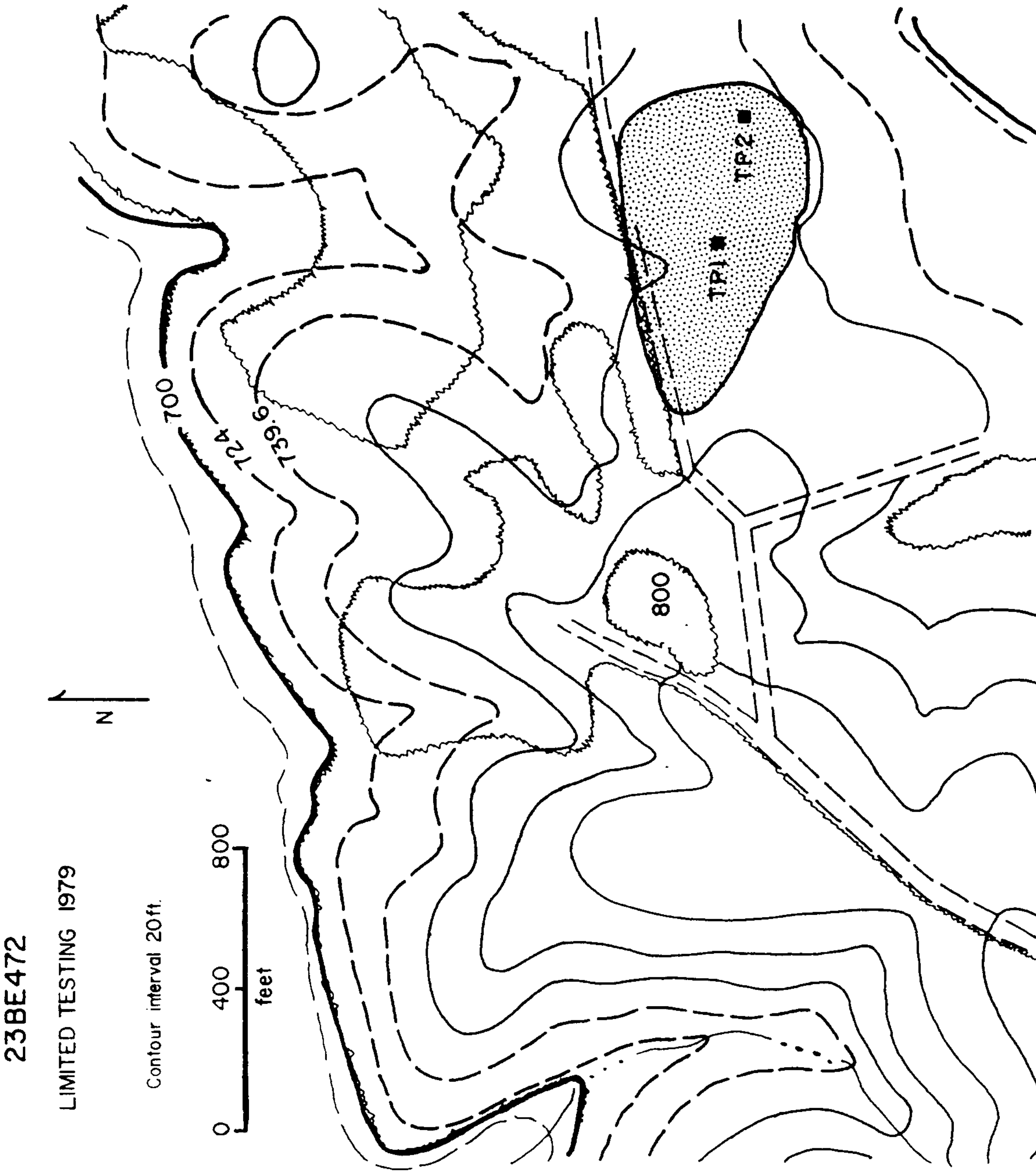


Figure 6.2. Site map, 23BE472.

In may, 1978, a crew returned to 23BE472 to examine the sub-surface attributes of the site. By that time the field had been abandoned and crop stubble and weeds made surface visibility poor. Five shovel test holes were placed in various areas across the site (see Fig. 6.2). Debris in two holes – 2001 and 2007 – extended below the fairly shallow plow zone. It appeared than that at least the portion of the site atop the ridge was partially undisturbed.

In March, 1979, the site was again resurveyed – this time as part of the 100% survey of Public Use Areas. Another surface collection was made and artifact density was high despite the nearly 90% ground cover. Further shovel testing confirmed that in the lower portions of the site (off the ridgetops) cultural material was confined to the plow zone – 15 cm.

Excavations

Later in 1979, as part of the investigations of multiple component sites for purposes of refining chronology, 23BE472 was more systematically tested. Two test units were excavated – one on the crest of the ridge and the other on the east facing slope (Fig. 6.2). In both units the plow zone was removed as a single unit and levels below that were excavated in 10 cm arbitrary units. Square 1, a 1x2 meter unit on the crest of the ridge, was excavated with a pick. The plow zone varied from 13 cm to 19 cm across the unit and was filled with loose rock. Only one other level was dug in that square due to the proximity of unconsolidated bedrock to the surface. In Square 2, originally a 2x2 meter unit, the plow zone and one 10 cm level were removed with shovels. Upon reaching the more rocky fill at that level, the unit was reduced to 1x2 meters and an additional 10 cm level was shoveled. In all levels from both squares all soil was passed through 1/4 inch mesh screen. The size and amount of natural rock was estimated; the majority of it was then discarded. Excavation in both units was terminated upon reaching the base of cultural deposits – at the level of unconsolidated bedrock.

STRATIGRAPHY

Due to the fact that 23BE472 is located in an upland setting, the depth of the cultural deposits is limited by underlying bedrock. On the terrace top, in Square 1, the bedrock appears very close to the surface. Below the shallow plow zone (ca. 15 cm) in that area there is more limestone than loose soil. The cultural deposits are largely confined to the plow zone.

In Square 2, the plow zone is somewhat deeper (ca. 25 cm) and contains fewer pieces of limestone. The soil below

the plow zone is orange-brown (10YR4/6) and is compact with a high silt content. Approximately three gallons of small limestone rocks were found in the 10 cm level below the plow zone. Undisturbed cultural material was found at that level. Below this, the limestone increases in size and quantity. By the depth of 45 cm below the surface cultural material was no longer present.

It appears that what little soil was present on these upland ridges has been disturbed and redistributed – probably by modern plowing. The soil and plow zone is deeper on the ridge slopes and may represent materials plowed and washed down from the ridge crest. The context of the cultural deposits on the ridge crest has been destroyed. Due to the shallow soils even on the slopes, *in situ* cultural remains are minimal.

COLLECTIONS

The debris and particularly the tool density at 23BE472 is high compared with other sites in the region. Materials recovered from the surface during the three separate surveys of the site include a wide range of tools (Table D-6.1). Some debris was collected during those investigations, but the emphasis was on the recovery of well-made tools. Clearly, the most abundant tool form at the site is the biface; 44 bifaces of various shapes, in addition to 17 knives and 57 biface fragments were recovered. Scrapers were also numerous, with 79 unifacially worked and seven bifacially worked specimens. The edges of these ranged from notched to convex, with straight-sided scrapers being the most frequently occurring form. Other finished tools include an axe, three cleavers, a drill, a denticulate, a graver, a perforator, and three scraper planes. Various earlier stages of lithic reduction are represented by raw material, cores, blanks, and preforms, as well as by several flakes and pieces of shatter. Additional artifacts include a pitted stone, a piece of ground stone, and two hammerstones. Fourteen projectile points were recovered from the surface.

Tools recovered from the two test squares are less diverse than those from the surface. However, a wider range of debris was collected from the excavations (Table D-6.2). The amount of shatter and number of flakes point to the high density of cultural material at the site. As can be seen (Table D-6.2), however, this density decreases rapidly below the plow zone. While most of the flakes in both squares were fragmentary, Square 2 includes primary and secondary flakes in addition to the more ubiquitous tertiary flakes. One piece of raw material was found in each square.

The tool inventory from the excavations (Table D-6.3), while not as diverse as the surface assemblage, similarly

represents a broad range of lithic manufacture stages. Five cores and a blank were recovered, as well as the raw material, shatter, and flakes. Once again, biface fragments were the most common tool form; nine were collected. Four scrapers and two projectile points were also recovered.

Identification of the chert from which the tools were made showed that of 225 identifiable pieces, 86% were Jefferson City. Burlington accounted for about 10%, and the rest were Chouteau, Roubidoux, and Indeterminate Mississippian and Ordovician. These percentages differ from those expected at 23BE125, one kilometer away (Ray, Vol. II). Chouteau is under-represented. However, since an identification of naturally occurring chert was not made in the area immediately surrounding 23BE472, it is not certain that Chouteau was being selected against.

Summary and Conclusions

Despite the number and diversity of tools at 23BE472, it is difficult to make more than general statements about its use. The minimal depth of the cultural deposits, due to the upland setting and plowing disturbance, leave little context to differentiate between occupations at the site. Many of the surface projectile points were identifiable to period (Table D-6.4). On this basis it can be said that the site was used at least from the Dalton period until the Late Woodland period. Such a statement does nothing to assign the cultural remains to periods of occupation. Unfortunately, the two projectile points recovered from the excavations are of little help in this respect since neither was complete enough to identify. It is likely that, with so little depth to the deposits, there is no stratigraphic separation of components.

It is clear that the area was used repeatedly and probably intensively. The tool diversity indicates that a wide range of activity occurred at the site. As there is no preservation of features, bone, or botanics, the extent of such activity is uncertain. With no temporal controls it is impossible to assess the range of activity during any period. Given these constraints, no further testing is recommended for the site, even though the area is slated for future development in conjunction with the reservoir. Apparent redistribution of materials across the site by plowing makes even controlled surface collection unwarranted.

REFERENCES CITED

Allgood, Ferris P. and Ival D. Persinger
1979 Missouri general soil map and soil association descriptions. U. S. Department of Agriculture, Soil Conservation Service State Office, Columbia, Missouri.

Roper, Donna C. and Michael R. Piontkowski
1977 Projectile points. Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. V: lithic and ceramic studies. Report to the Corps of Engineers. American Archaeology Division, University of Missouri-Columbia.

PART IV

EXCAVATIONS, 1977-1979

PART IV

CHAPTER 1

EXCAVATIONS AT SITE 23BE259, THE AVERY BRIDGE SITE

by

Janet E. Joyer

INTRODUCTION

Archeological site 23BE259 was originally recorded during Stage 1 survey in the summer of 1975. The site is buried beneath what was at the time of excavation a pasture/wasteland on the left bank of the Pomme de Terre River. Observation of the cutbank in June 1977 revealed flakes eroding from approximately 2½ meters below the surface. However, the site did also have surface expression at the time of recording in 1975.

The site was named the Avery Bridge Site because of its proximity (500 meters southwest) to the old Avery swinging bridge across the Pomme de Terre; a landmark now removed but operative at the time of excavation. The site is also 1.4 km west-southwest and therefore downstream from Rodgers Shelter (Fig. 1.1). Haynes (1977: 24) has mapped the locus as on an exposure of the Rodgers Alluvium which has been cut by the Pomme de Terre River. A small intermittent tributary borders the site on the west and the Pomme de Terre itself flows from northeast to southwest to form the southeast border of the site (Fig. 1.2). Elevation is approximately 680' AMSL. Soils are mapped by Johnson and Miller (1977) as $DFeEoe_1$ (Dystric Fluventic Eutrochrept), an immature soil or Inceptisol.

TEST EXCAVATIONS

Testing began at the Avery Bridge Site in July 1977 under the supervision of Michael R. Piontkowski. Since both surface and buried materials had been observed between 1975 and 1977, two hand excavated test pits were first placed on the site area to determine stratigraphy and assess the data recovery potential. The two 1x2 meter units were spaced about 18 meters

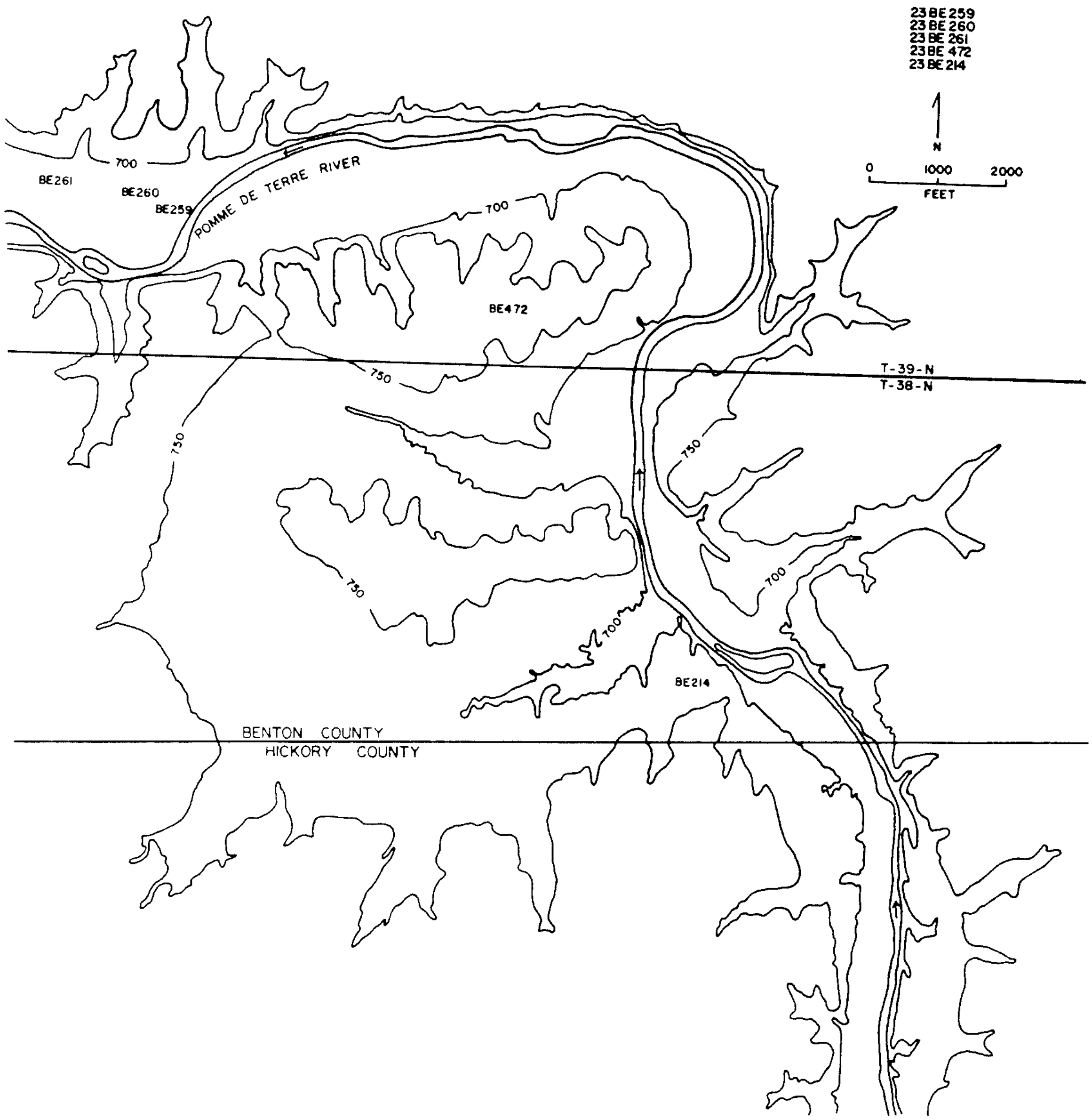


Figure 1.1. General vicinity map — 23BE259 and nearby sites.

apart and were each placed two meters from the north bank of the Pomme de Terre River with their long axes running parallel to the river (Fig. 1.2).

Test Pit 1 had a fairly simple profile of silty loam grading to silty deposits overlying a reddish brown clay (Fig. 1.3a). Cultural debris was present throughout the deposit but was generally light (as little as 1 or 2 flakes per level) throughout the excavation. The excavation was terminated at 125 cm below the elevation of the surface at the southeast corner.

Test Pit 2 had a somewhat more complicated profile (Fig. 1.3b). A thin humus layer (ca. 0 to 10 cm below surface) overlay a brown silt (ca. 10 to 65 cm below surface), which in turn overlay a darker brown (at least visually; Munsell colors were the same) clay (ca. 65 to 100 cm below surface). A thin layer of gravel was then encountered between 100 and 110 cm below the surface. Below the gravel was a clay layer mixed with some sand at the top but becoming clayier with increased depth.

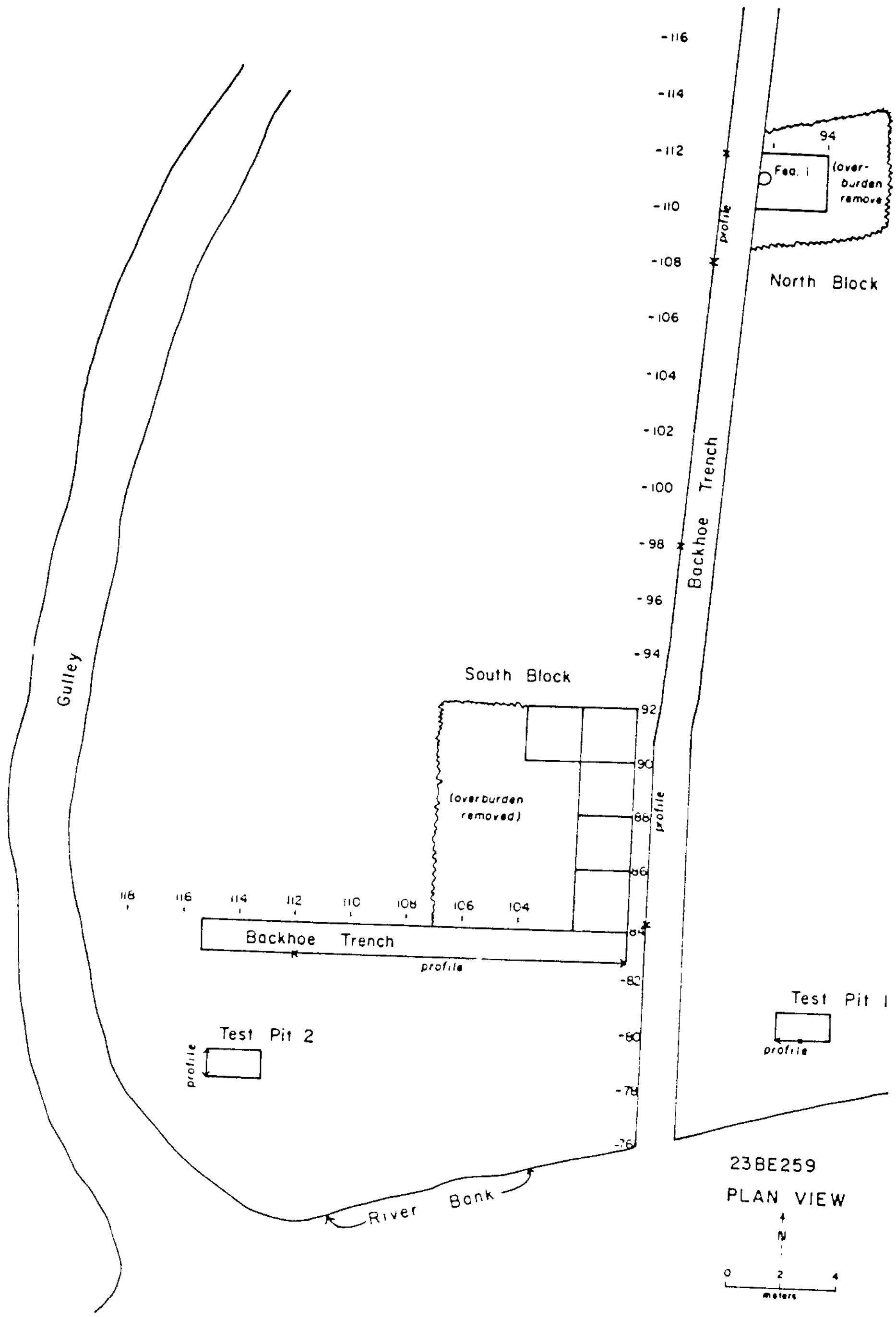
Lithic debris was encountered in Test Pit 2 from the surface and throughout the deposits. It was very light, however, from the surface to about 65 cm below the surface; in other words, in the humus and silt zones at the top of the profile. Flake density increased markedly at the top of the dark clay zone, but immediately dropped off. Lithics continued to be found in small quantity throughout the remainder of the excavation which was terminated at 210 cm below the surface.

The profiles in these two units are interpreted as representing Holocene age Rodgers Alluvium at the bottom, overlain by the recent Pippins Alluvium. The dark clay layer in Test Pit 2 was eventually interpreted as a deposit from the intermittent stream which flows about 3 meters west of the pit. It is this layer that contains the highest lithic density. That this material was likely redeposited is clear now but was not at the time, not until a more extensive excavation was undertaken at the site.

DEEP TESTING AND EXCAVATION

The presence of flakes eroding from the river bank indicated the likelihood of buried deposits being present at the site. A series of backhoe trenches and later block excavations were therefore excavated to investigate the cultural deposits and their sedimentary matrix.

Prior to excavation in the two blocks, a vertical datum was placed and a horizontal grid was superimposed on the site. The vertical datum was placed by setting a large nail in a



-116
-114
-112
-110
-108
-106
-104
-102
-100
-98
-96
-94
94
Fea. 1
(over-burden remove
profile
North Block
Backhoe Trench
South Block
92
90
88
86
84
-82
-80
-78
-76
(overburden removed)
profile
118
116
114
112
110
108
106
104
Backhoe Trench
profile
Gulley
Test Pit 2
profile
Test Pit 1
profile
River Bank
23BE259
PLAN VIEW
N
0
2
4
meters

Figure 1.2.

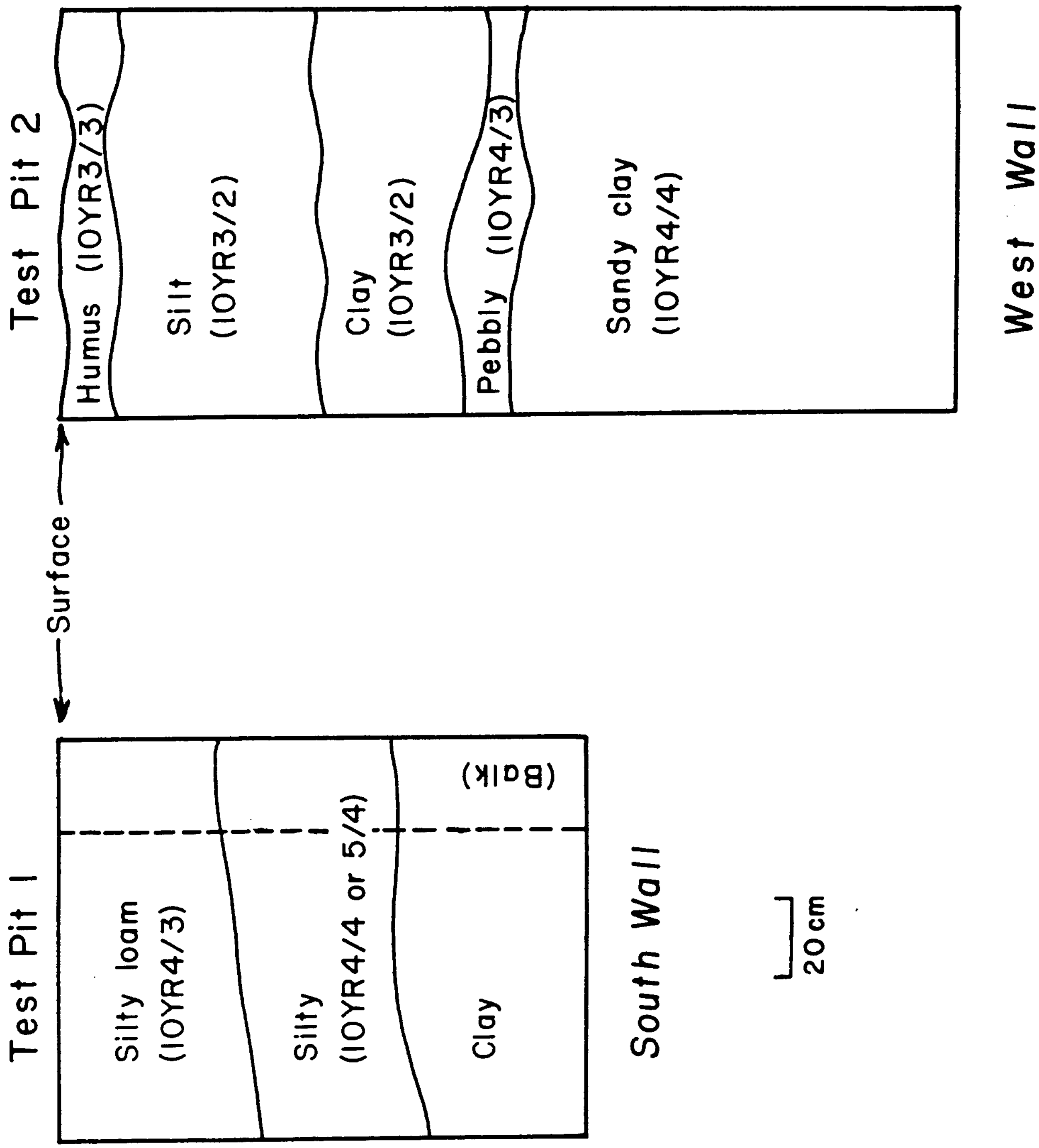


Figure 1.3. Test pit profiles; (a) test pit 1, (b) test pit 2.

tree near the intermittent stream bank to the northwest of the site. The datum is 130 centimeters above the surface of the ground at that locus. The origin of the grid was an arbitrary and imaginary point in the river to the southeast of the site. Use of such a point of origin ensures that all excavations will be within a single quadrant. All square referrents for both blocks and all profiles employed these two reference points.

The first of the trenches was a 50 meter long north-south trench between the two test units (Fig. 1.2). The profile exposed in this trench proved to be complex. The most prominent unit revealed in the profile, of the southern portion of the trench (Fig. 1.4), and the unit of most archeological interest, was a dark layer with a high density of charcoal. This layer varied in thickness from 20 to 90 cm, although additional fragments of charcoal were recorded both above and below the main concentration. The general texture of the matrix was clayier than the overlying sediments. The total length of the layer in the trench was about 12 m, extending north from the southern edge of the trench at the river bank. Some flakes of apparent cultural origin and some possible fire-cracked rocks were present in this dark layer. Artifacts included a Smith Basal-Notched projectile point. The dark layer was considered as a possible occupation level.

Further north in the trench and extending from 15 to 37 meters north of the river was another dark layer with dense charcoal (Fig. 1.5). This was interpreted to represent an old scour channel of the Pomme de Terre River. Below the layer in the east wall of the trench was an area of bright orange burnt earth. It appeared to represent some sort of cultural feature, but it was not possible to discern its nature without excavation.

A second backhoe trench was placed in an east-west direction and therefore perpendicular to the first trench. It extended 16 meters to the west of the original trench (Fig. 1.2). The south profile of this trench is shown in Figure 1.6. The dark layer is well defined at the eastern end but its upper boundary becomes diffuse to the west.

On the basis of the information obtained from the two long trenches, two areas were selected for excavation to more fully document the nature of the archeological deposits. These two areas are referred to as the North Block and the South Block (Fig. 1.2). The North Block was placed on the east side of the north-south trench and directly over the burnt earth feature. The south block was placed at the intersection of the two trenches with a half-meter wide balk left between the block and the north-south trench (Fig. 1.2). A backhoe was used to remove overburden from each block.

FIGURE NOT AVAILABLE

Figure 1.4.

FIGURE NOT AVAILABLE

Figure 1.5.

FIGURE NOT AVAILABLE

Figure 1.6.

NORTH BLOCK

Excavations

The north "block" was actually little larger than a single 2x2 meter square, opened with a northwest corner at 112N 96W. The surface at this point was 1.50 meters below the vertical datum. Overburden was mechanically removed to a depth of 2.60 meters below the datum (m.b.d.) at which level hand excavation began. Lithic debris was limited to no more than 1 or 2 flakes per 5 cm level until a depth of 3.10 m.b.d. was reached. Flake density increased dramatically at this depth and continued high for 15 to 20 cm. A bifacial tool, a projectile point fragment, and a nearly whole projectile point identified as Jakie Stemmed were all found between 3.10 and 3.15 m.b.d. Bone fragments, nearly all of which were unidentifiable, and charred nut shell fragments accompanied the artifacts.

The feature itself was also encountered at the 3.10 m.b.d. level and was followed to the base of the excavation at 3.43 m.b.d. It was comprised of fire-cracked chert and burnt sandstone with tiny bone fragments, nut shell fragments, and charcoal flecks intermixed with the fill. All charcoal was collected for later dating, but the amount actually collectable for dating was small (too small for adequate dating, as it turned out). Feature excavation proceeded by cross-sectioning and horizontal excavation, pedastalling rocks and sections of burnt earth that were to be sampled for archaeomagnetic dating.

The edges of the feature were delineated by a one to three centimeter wide curving band of burnt earth. This line was actually two concentric bands, an outer one of bright orange and an inner dark brown band. The base of the feature was not so marked, however. The soil at the base simply became darker in color and clayier in texture. The presence of the orange burnt earth at the side of the feature leaves little doubt that the burning occurred where the feature was located.

Additional excavations were conducted in the block away from the feature itself. However, only a few small flakes, a few charred nut shells, and occasional scattered flecks of charcoal were encountered.

Dating

The presence of charcoal, <u>in situ</u> burned earth and burned limestone in the single feature suggested the possibility that the feature could be triple-dated – that is, radiocarbon, thermoluminescence and archeomagnet were all possible. The archeomagnetism samples were taken in August 1977 by Margaret

D. Mandeville, a member of the project staff who had extensive experience in removal of archeomagnetism samples. Eight sample cubes were taken using standard procedures (see Eighmy 1980 for a discussion of these procedures). These were submitted to Dr. Daniel Wolfman of Arkansas State University for determination. Dr. Wolfman reported that the sample will be datable, but only after the polar curve for the Midwest is extended farther back in time (see Vol. I, Appendix B).

Three samples were submitted to the Thermoluminescence Laboratory of the University of Missouri for age determination. The dates are as follows:

Sample - 23BE259-1: 2223 ± 111 B.P.

Sample - 23BE259-2: 2335 ± 327 B.P.

Sample - 23BE259-3: 2232 ± 216 B.P.

These dates show a remarkable degree of consistency but seem young for the associated Jakie Stemmed point.

Finally, a single charcoal sample from the feature was submitted to Dicarb Radioisotope Company. The laboratory report indicated, however, that the sample was insufficient to yield a reliable date (DIC-1916).

The presence of the single Jakie Stemmed point suggested a Middle Archaic age for the feature. The TL dates are not consistent with such an identification. There are a variety of possible explanations for the discrepancy. The thermoluminescence dates could be in error, although the stratigraphy suggests that they may not be sufficiently erroneous to account for the point. The point could be misidentified. Its base is damaged, but enough remained that the identification was made with some confidence. The point could simply be out of place and its association spurious. Hopefully, the polar curve will soon be available to provide an absolute date for the archeomagnetism sample.

SOUTH BLOCK

Excavation

Overburden was mechanically removed from an area measuring approximately 8x8 meters (Fig. 1.2). A grid of 2x2 meter squares was then placed within the block. This grid was, of course, simply a portion of the grid superimposed on the entire site. Four contiguous 2x2 meter squares were then hand excavated along the east wall of the block (Fig. 1.2). These units were referred to by the coordinates of their northwest corners and were designated 86N 100W, 88N 100W, 90N 100W, and 92N 100W. Excavations were conducted by skim-shoveling in 5 cm levels.

From 3.00-3.30 m below datum the soil was a medium brown (slightly reddish) clayey silt, with some grey and yellow mottling. Some large pieces of charcoal were present, mainly in the western parts of units 86, 88 and 90N.

At 3.35 m below datum, a rapid change in soil was observed in all units. The medium brown soil had a distinct contact with a grey soil of approximately the same texture. By this level, charcoal chunks and flecks were abundant in the soil. Charcoal increased in size and quantity until 3.75 m.b.d., where it stabilized at a relatively high amount. Charcoal samples were taken each level from most units from the 3.25-3.30 level down to 4.05 m.b.d. Charcoal was saved only when there was enough to fill a small film canister.

The soil color became increasingly dark until a depth of 3.85 m.b.d. at which point it began to lighten gradually through the excavation. As the soil lightened, it became clayier in 88 and 90 and sandier in 92N. Gravel, meanwhile, made its first significant appearance at 3.65 m.b.d., and steadily increased until 4.10 m.b.d., immediately prior to the end of excavation. The gravel was a mixture of chert and sandstone pebbles and occurred in patches. Much of the chert was rounded, with a brown patina indicative of river wear. Samples of this gravel were saved with the general cultural debris as representative samples of the makeup of the gravel matrix.

Charcoal concentration in the soil decreased markedly at 4.05 m.b.d. and was almost gone by 4.15 m.b.d. Between 4.05 and 4.15 m.b.d., a thin even layer of gravel was encountered. Immediately below it, the soil changed to a bright orange clay.

Cultural Remains

The cultural remains in these four units were sparse. Very few flakes were found in any level. Flakes and shatter appeared in the 3.15-3.20 m.b.d. level. Flake frequency increased markedly in the next level (Fig. 1.7) and remained highest for 10 cm. Below 3.35 m.b.d., however, frequency dropped rapidly. These trends represent all squares combined and vary slightly from one excavation unit to another.

Tool density, while not particularly high in absolute terms, appears high relative to flake density. Tools recovered from the four units include two projectile points, both of which are identified as Etley, one whole and one fragmentary biface, two utilized flakes, and at least six "cores."

Tools and debris are backplotted on the profile of the adjacent section of the trench wall in Figure 1.4. This

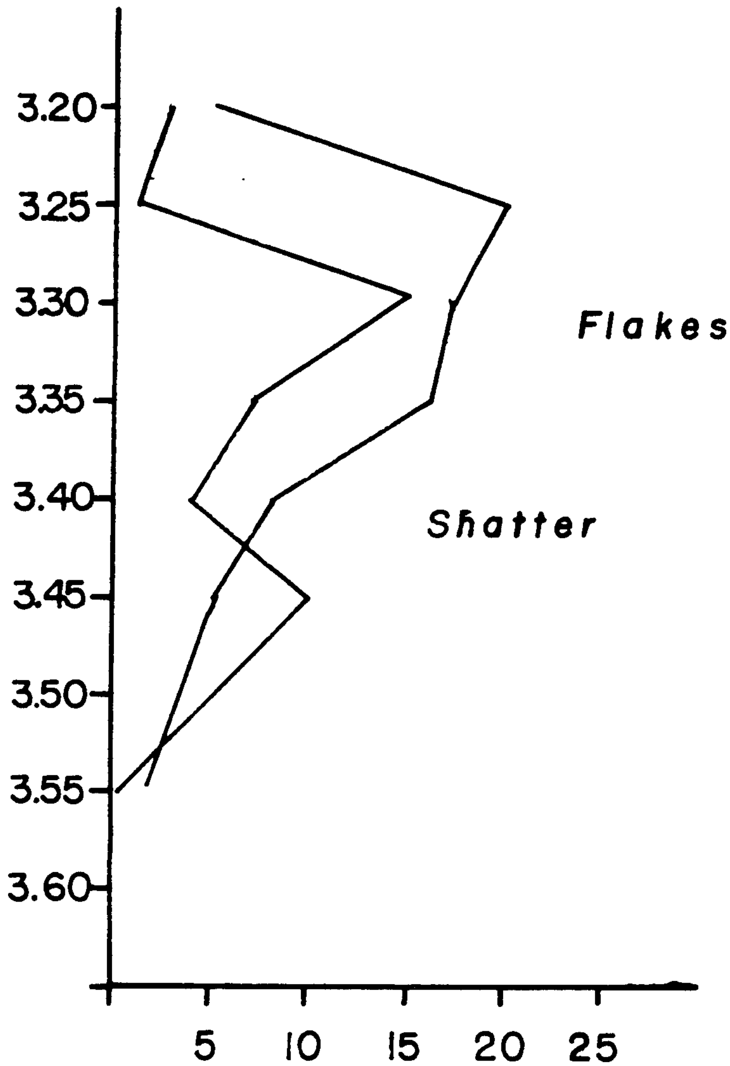


Figure 1.7. Flake frequency distribution - South block excavation.

shows that the major flake density and many of the tools were found within the distinct stratigraphic layer referred to in the field and in the present text simply as the dark layer.

DISCUSSION

The deposits at 23BE259 are geomorphically complex, but hold virtually no archeological potential. In fact, the case may be made, using several lines of evidence to suggest that the south block debris is redeposited while the north block represents a limited occupation only.

The single feature in the north block is the one item whose provenience must be primary. The intense burning that appears within and around the feature makes it clear that it has to be in place. This area, then, represents a probably small ephemeral occupation similar to those known to be associated with Dalton occupations at Rodgers Shelter (McMillan 1976), Dalton and Early Archaic sites on the Osage River (Piontkowski 1977) and Sac River (Collins et al. 1979), and at the Late Archaic site 23SR675 (Stiles-Hanson and Goldberg, this volume). Materials associated with the hearth are sparse, as they often are at the sites just referenced. The virtual lack of additional material in the excavation unit surrounding the feature prompted the discontinuation of the excavation in this area. In light of recent work by Binford (1983: 149-160) on material distributions surrounding hearths, it is possible that a somewhat higher debris density would have been found in a narrow zone surrounding the hearth had the excavation been broadened. Given the lack of evidence for cultural material in the trench profile, however, it is apparent that expansion of the north block excavation area would have produced little else.

The southern block was excavated because evidence from the backhoe trenches suggested a denser archeological deposit. Excavations were completed in only four units and begun in two others before a consideration of the stratigraphy and the nature of the assemblage being recovered convinced us that it was redeposited.

In the first place, the stratigraphy of the site and its immediate context appears to represent an alluvial fan. An intermittent stream borders the site on its west edge. The cutbanks of this stream reveal a gravel lens that thickens as the hillslope is approached and indicates that colluviation has been an important factor in the formation of the modern land surface. Rapid runoff from the hillslope following a forest fire could easily account for both the dark layer with its abundant charcoal and the limestone present in this layer.

Additionally, however, is the anomalous assemblage. The tool/debitage ratio is unusually high and is particularly curious since half of the tools were classified as cores. These pieces of chert are angular and retain sharp edges, as is characteristic of cores. Since the limestone on the hill-slope is cherty, however, it should not be surprising to find chert "cores," "shatter," and even "flakes" in the colluvium. A persistent problem in conducting upland surveys in the Truman area is distinguishing real sites from scatters of residual chert. Colluvial deposits can be equally as deceiving.

Several unquestionable tools were found in the deposit, including two Late Archaic projectile points (three counting one recovered from the initial trench profile) and two bifaces. It is very possible that an unrecorded (and perhaps largely destroyed) Late Archaic site lies (or lay) on the hillside above 23BE259 and that its materials were stripped and included within the colluvial deposits.

Overall, the archeological deposits at 23BE259 hold no potential to contribute further useful information. The majority of the material is interpreted as redeposited from the adjacent bluff. Charcoal samples were easily obtained from the excavation, but dating would have been meaningless. The one area with *in situ* deposits is interpreted as an ephemeral occupation of probable Middle Archaic age. Further, investigation would likely produce very limited additional data. Accordingly, no further work is recommended at this site.

REFERENCES CITED

Binford, Lewis R.
1983 In pursuit of the past. Thomas and Hudson, London.

Collins, C. D., A. A. Danielsons, and J. A. Donohue
1979 The Downstream Stockton study: investigations at the Montgomery Site, 23CE261. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Eighmy, Jeffrey L.
1980 Archeomagnetism: a handbook for the archeologist. Cultural Resource Management Studies. U.S. Department of the Interior, Heritage Conservation and Recreation Service. Washington, D.C.

Haynes, C. Vance
1977 Report on geochronological investigations in the Harry S. Truman Reservoir area, Benton and Hickory counties, Missouri. In Cultural resources survey, Harry S. Truman Dam and Reservoir Project, Vol. X: environmental study papers, pp. 23-32. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Johnson, Donald L. and Michael V. Miller
1977 Soils of a selected part of the lower Pomme de Terre River, Hickory and Benton counties, Missouri (map). In Cultural resources survey, Harry S. Truman Dam and Reservoir Project, Vol. X: environmental study papers. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

McMillan, R. Bruce
1976 The dynamics of cultural and environmental change at Rodgers Shelter, Missouri. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 211-232. Academic Press, New York.

Piontkowski, Michael R.
1977 Preliminary archeological investigations at two Early Archaic sites: the Wolf Creek and Hand Sites. In Cultural resources survey, Harry S. Truman

Dam and Reservoir Project, Vol. IX: preliminary studies of Early and Middle Archaic components, pp. 1-57. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

PART IV

CHAPTER 2

EXCAVATIONS AT 23BE337 – THE TERRE BABY SITE

by

Donna C. Roper and Susan K. Goldberg

Introduction

The Terre Baby Site, 23BE337, was originally recorded during the Stage 1 survey in July 1975. At that time, it was in a planted field but with the early July conditions providing 50-90% surface visibility. The original survey form suggests that the site extends for 2300 meters along the edge of a terrace, but further examination suggests it could not possibly be that long.

The site is located in Alexander Township in Benton County. It is on the west bank of the Pomme de Terre River and immediately north of the Highway 83 bridge over the river. The site lies at an elevation between 660' and 680' AMSL (actually closer to 680') along the edge of a terrace of the Pomme de Terre. The river itself describes a southeast to northwest course that is interrupted by a meander to the northeast of the site (Fig. 2.1). The extent of the scatter is along the terrace edge, back from the edge, and along the terrace scarp onto the extreme back edge of the floodplain (Fig. 2.2). Soils are classified within the Hartville-Ashton-Cedargap-Nolin association of Ozark bottomland soils (Allgood and Persinger 1979).

To the west of the site rises a steep rock bluff which contains an abundance of chert nodules. An area of 1 km radius centered on 23BE337 was inventoried for chert resources by Ray (Vol. II). On the basis of this survey, he projected local availability to be 75% Jefferson City chert, 17% Burlington chert, and 8% Chouteau chert.

The site was revisited in early June 1977 to shovel test it and determine the horizontal and vertical extent of scatter. The surface was walked to determine debris concentrations and recover diagnostic material. The first shovel test holes were placed to the west of a creek or gully dividing the site as originally mapped. No subplowzone

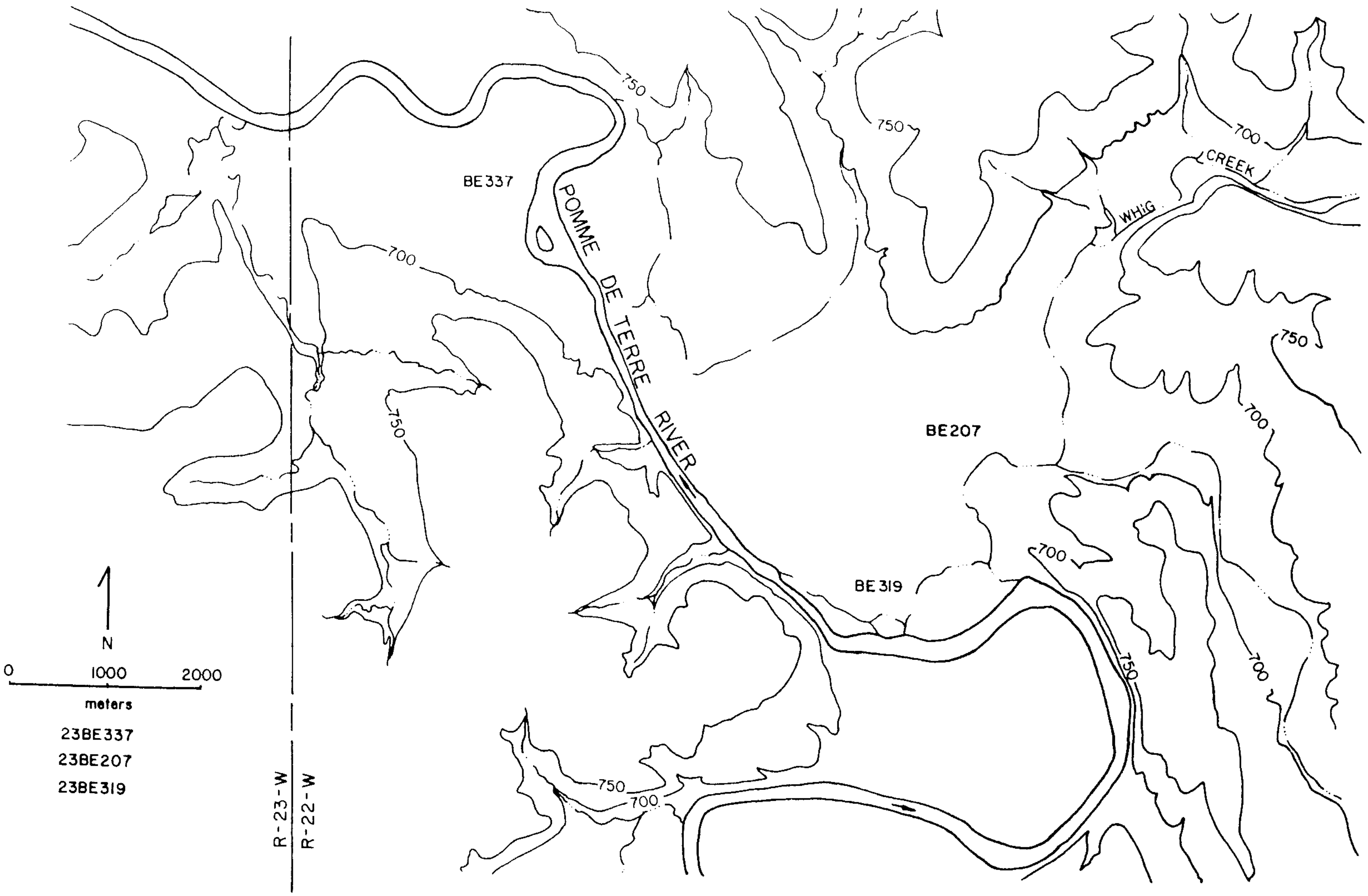


Figure 2.1. The location of 23BE337 relative to the Pomme de Terre River valley and nearby sites.

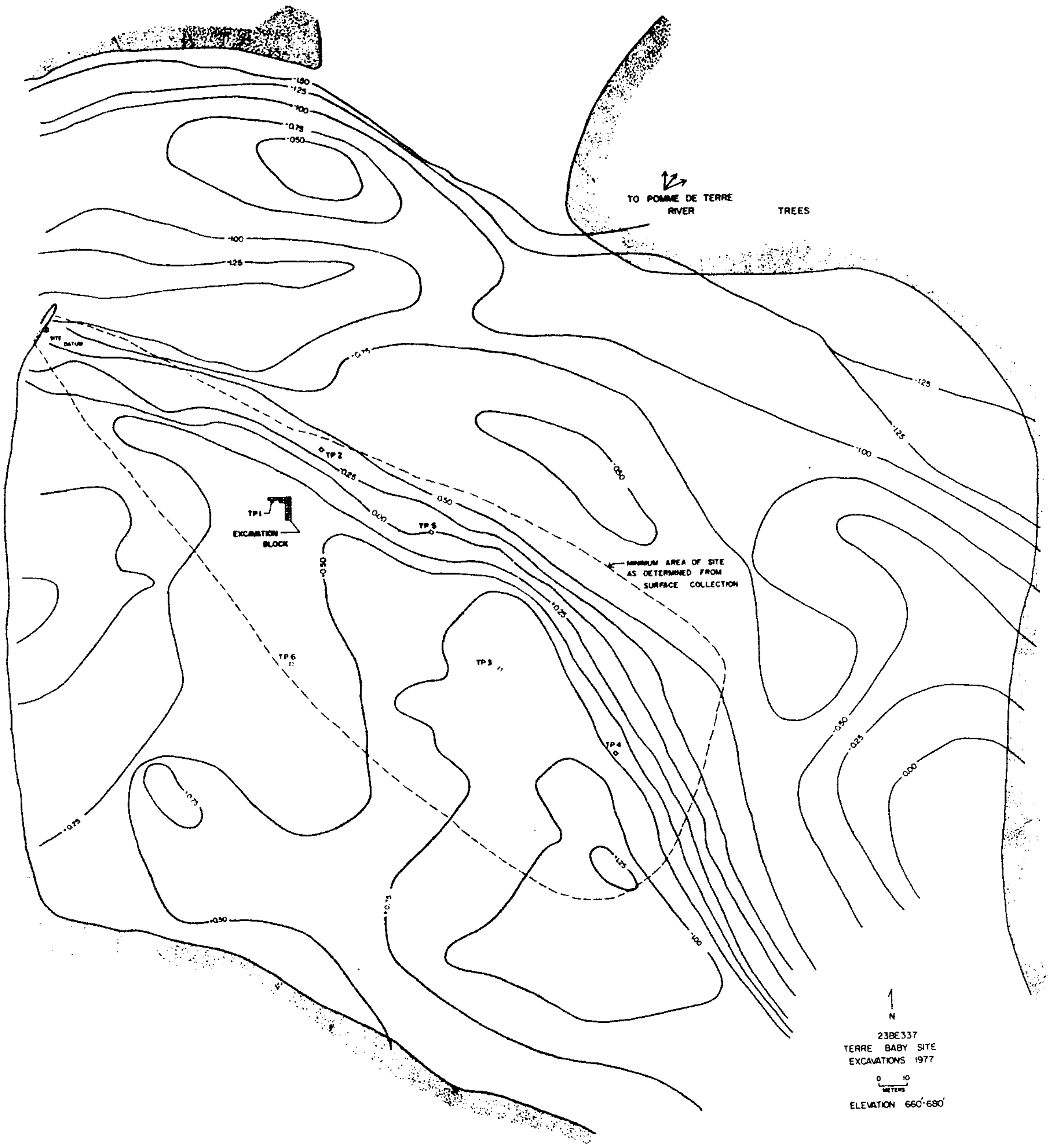


Figure 2.2. Site topographic map of 23BE337, showing locations of test pits, excavation block, and area of scatter.

debris was encountered in these tests. Shovel test pits in the east half of the site, however, did reveal debris below the plowzone and in at least one instance, the debris density was quite high. This evaluation suggested that the site was probably two sites separated by a stream and break in debris. The west portion of the site was judged to have little potential; further testing was recommended for the east portion.

The Test Excavations

A site datum was established at the edge of the brush on the northeast side of the stream crossing the terrace (Fig. 2.2) and five 1 x 1 meter test squares were laid out. Squares 1, 3 and 4 were placed at intervals of 100 meters along the terrace edge; square 2 was on the slope of the terrace (Fig. 2.2) and 24 meters north-northeast of square 1. Square 5 was 50 meters southeast of square 2.

Within each square, the plowzone was removed as a unit, with subplowzone deposits removed in 10 cm levels. All fill was passed through 1/4" mesh screen, except that from deeper levels. Shovelling even as deep as a meter in a 1 x 1 meter square is logistically difficult, so excavation proceeded by troweling without screening.

Square 1 had a plow zone (A in Fig. 2.3) whose thickness varied slightly between about 21 and 23 cm. It is described as a very dark brown (10YR2/2) loam. Pottery and a fairly high density of lithics were collected in the plowzone. The sub-plowzone deposits were described as a single zone (B in Fig. 2.3). This zone is described as dark brown (10YR3/3) silty clay with some grey mottling in the lower portion of the excavation. Soil color gradually becomes slightly lighter as depth increases.

This square was excavated to 70 cm below the base of the plowzone. Debris density continued to be high through the 20-30 cm BPZ level, and in fact peaked in that level, declined in the 30-40 cm BPZ level, and dropped off sharply to the bottom of the excavation (Table E-2.1A). Ceramics were present through the 10-20 cm BPZ level.

Square 2 had a rather different profile than Square 1. The plowzone was thicker than in square 1 and measured up to nearly 40 cm below the present ground surface. Its color may be described as dark yellowish brown (10YR/4/4) in the Munsell soil color system. Its texture is described as silt loam. Debris density in the plowzone is high (Table E-2.1B) and includes debitage, bifaces, unifaces, ground stone and hematite.

Deposits immediately below the plowzone for about 70 cm are very dark greyish brown (10YR3/2) silt (B in Fig. 2.4).

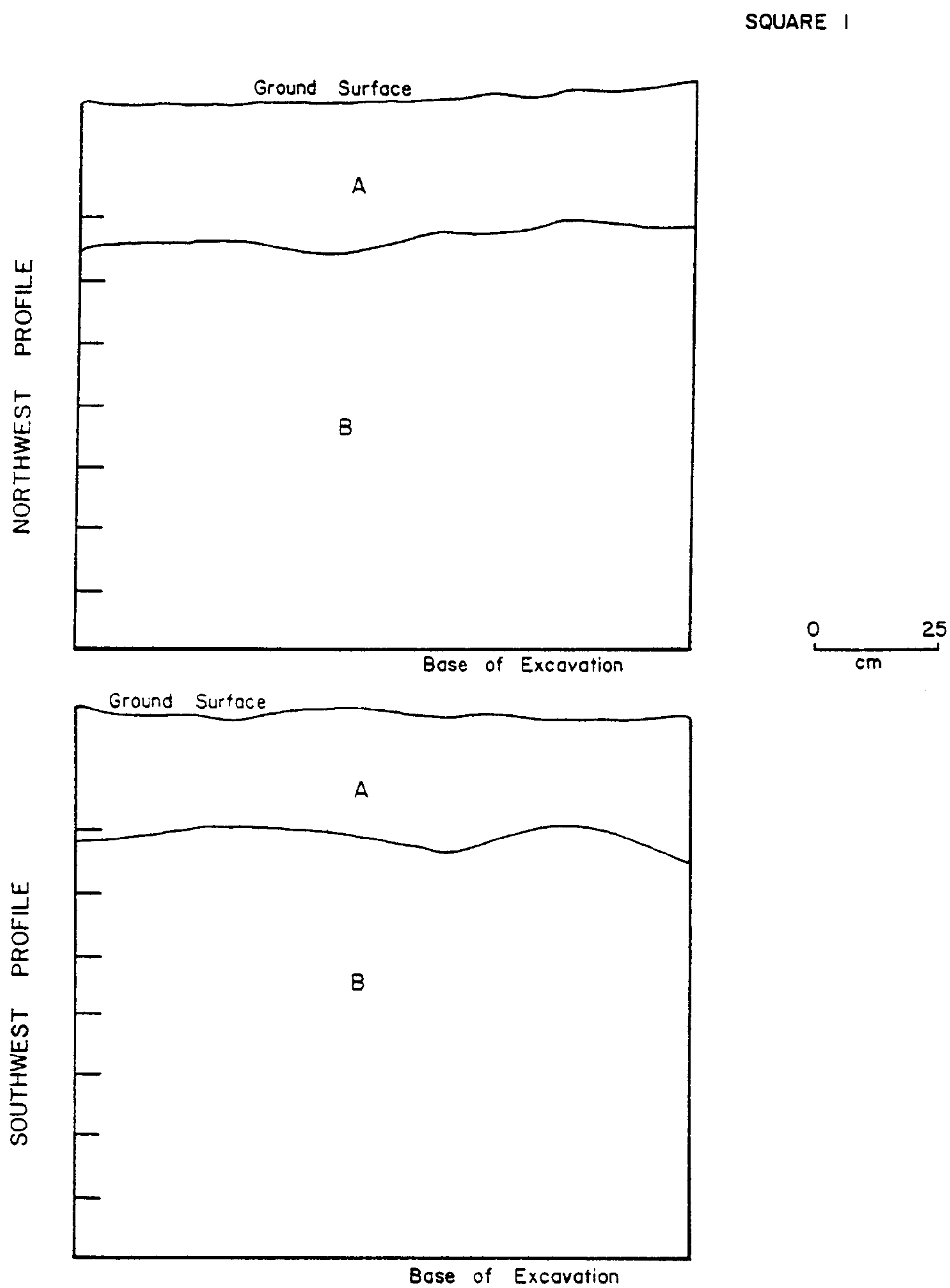


Figure 2.3. Profiles of Test Square 1, 23BE337.

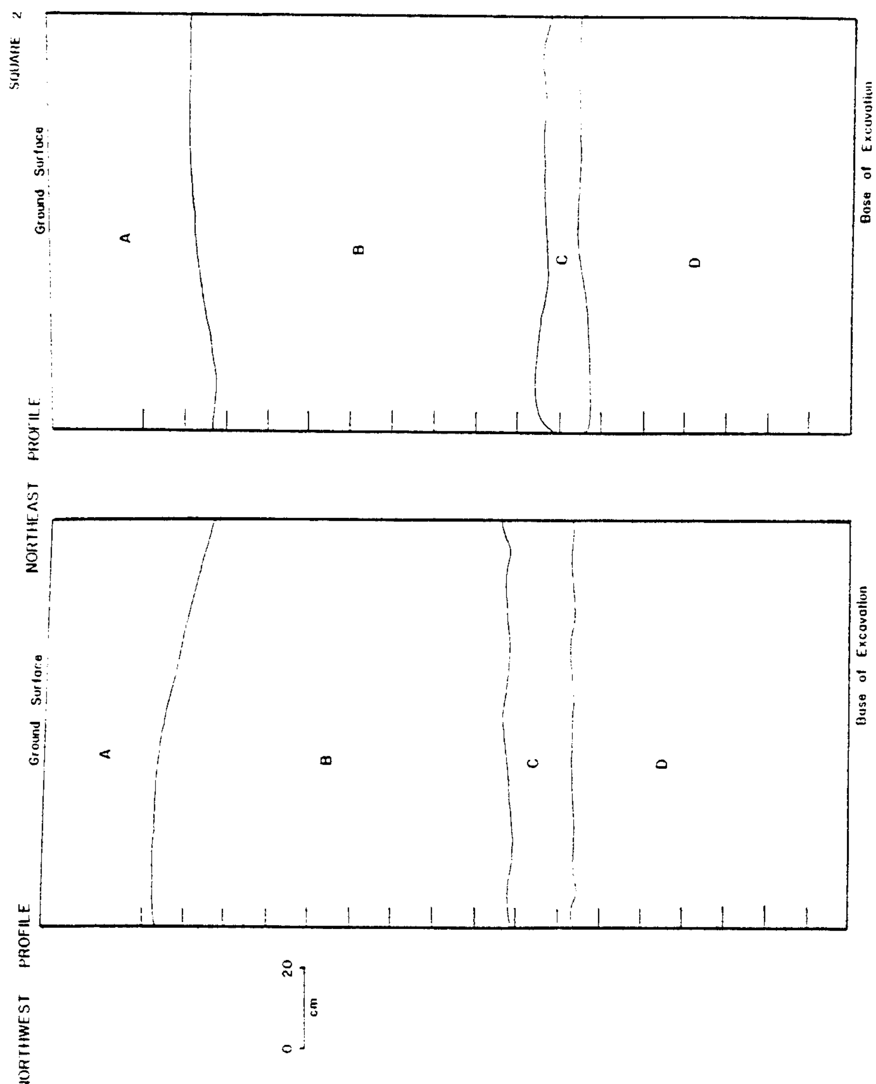


Figure 2.4. Profiles of Test Square 2, 23BE337.

Below this is a thinner layer of about 15 cm (C) that is described in field notes as medium brown silty clay. Below this, Zone D (Fig. 2.4) is a dark brown (10YR4/3) clay. This zone continues to the bottom of the excavation at 180 cm below the base of the plowzone.

Cultural material continued throughout square 2 (Table E-2.1B). Density continued to be rather high through the 20-30 cm BPZ level, then fell sharply in the 30-40 cm level. A small quantity of debris was then encountered in each successive level through the 70-80 cm BPZ level. This debris included both lithics and ceramics. The SELGEM catalog contains no debris entries for the 80-90 cm level, although the field notes suggest that "six or seven" flakes and some miscellaneous rock were found. It does, however, list a biface from this level. In any event, in the 90-100 cm BPZ level, debris density once again rises through the bottom of the excavation, attaining its maximum in the 140-150 cm BPZ level. Lithics, but no additional ceramics, were recovered from these levels.

Square 3 had a 30 cm thick plowzone whose color was described as dark yellowish brown (10YR3/4) and whose texture is described as "loose and crumbly." Excavations continued only through the 20-30 cm BPZ level. The subplowzone deposits (B in Fig. 2.5) are dark brown (10YR3/3) loose and crumbly soil. Debris density in this square was considerably lower than in squares 1 and 2 (Table E-2.1C). One sherd was recovered in the plowzone and one biface fragment was recorded in the 20-30 cm BPZ level; the remainder of the debris was unmodified debitage.

Square 4 had a plowzone that varied between 25 and 28 cm in thickness. The plowzone fill is described as dark brown (10YR3/3) loam. It had a moderate debris density that was comprised entirely of lithics but included one projectile point, a core, two scrapers, and a drill in addition to unmodified chipping debris (Table E-2.1D). The subplowzone deposits in this square (B in Fig. 2.6) are a dark brown (10YR4/3) silty clay that was markedly different from the plowzone and was considerably harder to screen. Debris density in the 0-10 cm BPZ level was low and entirely comprised of unmodified debris (Table E-2.1D). Deeper excavations were unwarranted and excavation was terminated at this level.

Square 5 had a plowzone of only 20 cm thickness. Its color is described as dark brown and registers 10YR3/3 on the Munsell soil color chart. Its texture is described as loose and crumbly. An approximately 15 cm thick layer below the plowzone (B in Fig. 2.7) was also 10YR3/3 in color but had a distinctly more compact texture. Zone C (Fig. 2.7) below this is a dark yellowish brown (10YR4/4) zone which is even more compact.

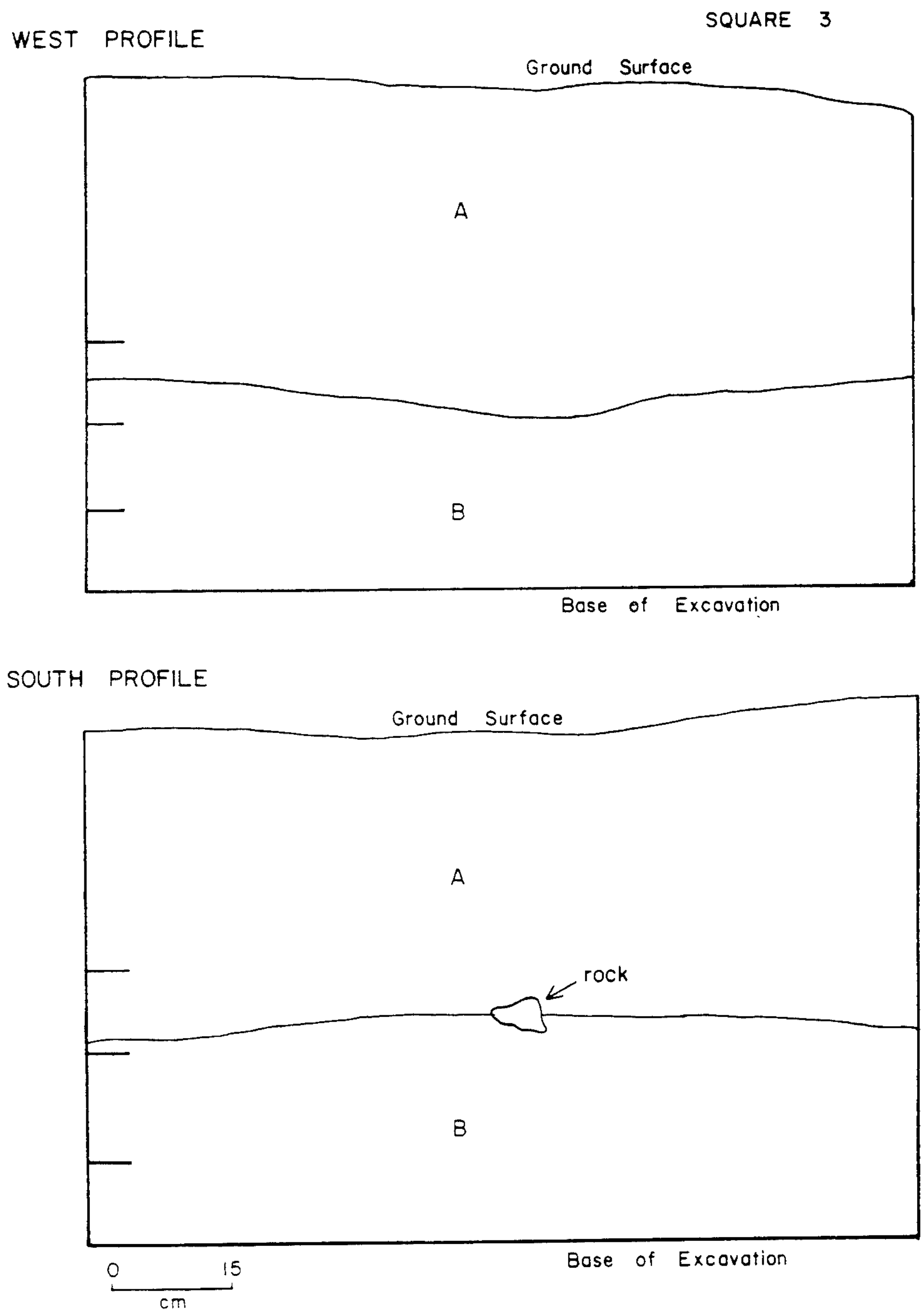


Figure 2.5. Profiles of Test Square 3, 23BE337.

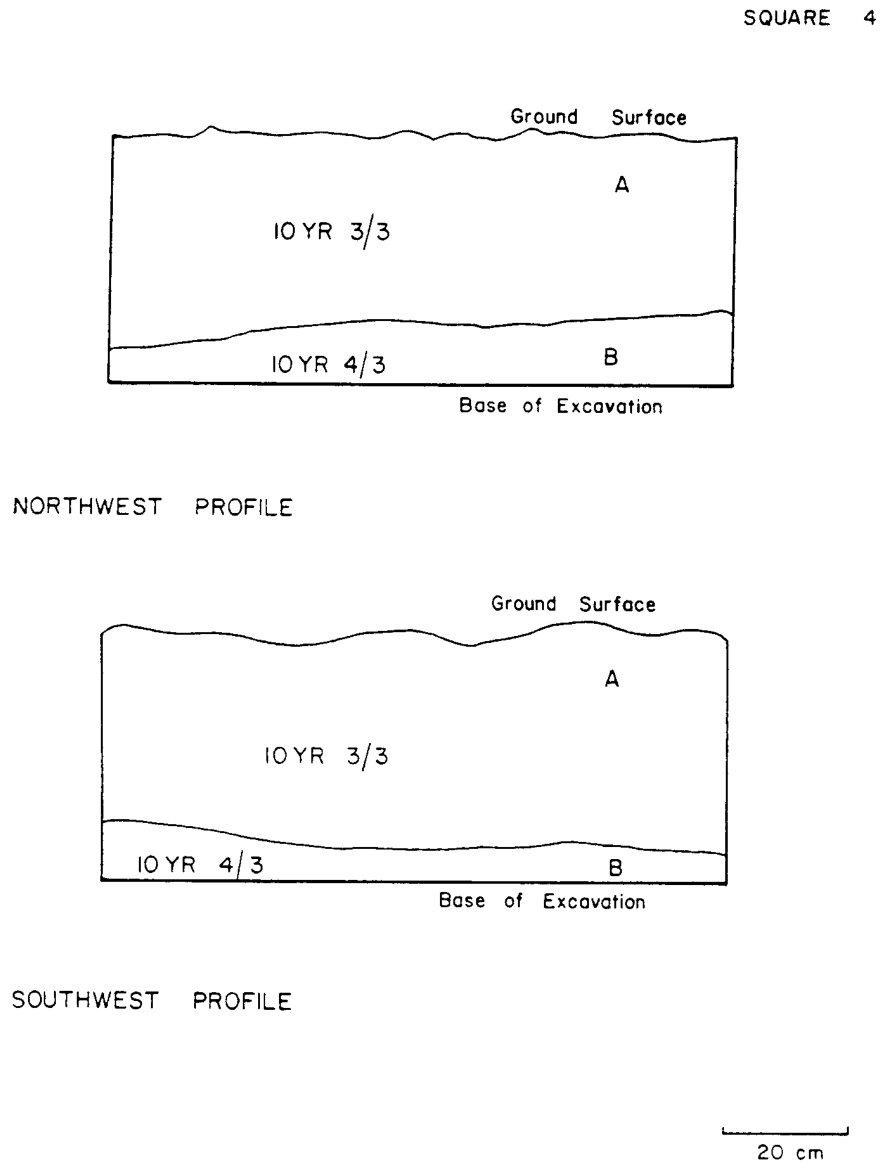


Figure 2.6. Profiles of Test Square 4, 23BE337.

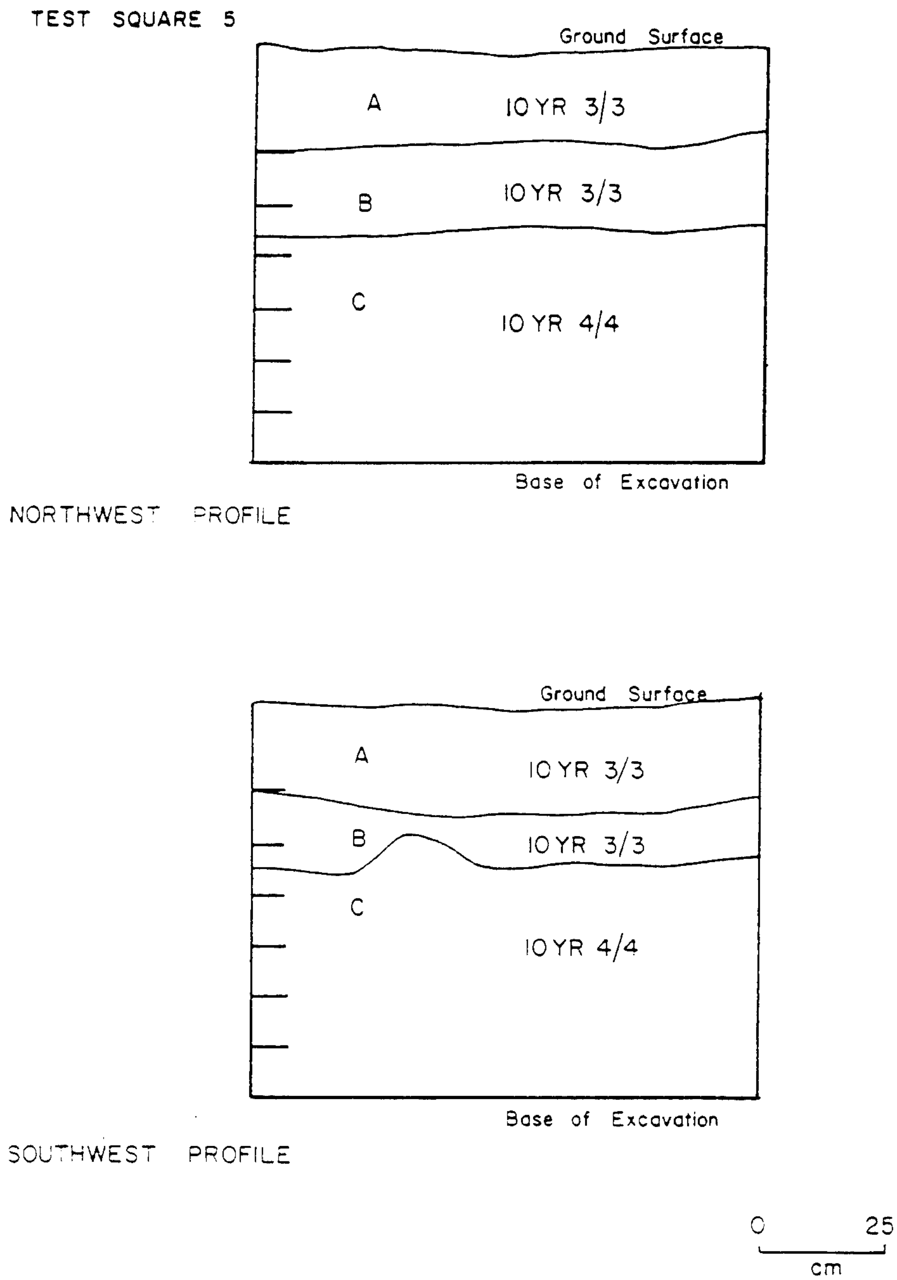


Figure 2.7. Profiles of Test Square 5, 23BE337.

Debris density in square 5 was high in the plowzone and 0-10 cm BPZ levels (Table E-2.1E). It was considerably reduced in the 10-20 cm BPZ level and dropped even lower in subsequent levels. Excavations continued through the 50-60 cm BPZ levels.

At the commencement of the test excavations the field had been newly disked and needed a good rainfall to provide optimum surface collection conditions. Such a rainfall occurred a few days after the initiation of the test excavations and provided ideal conditions for determining the area of scatter and debris concentrations. Accordingly, the surface was inspected. Observations made during this inspection suggested that debris density was highest along the crest of the terrace and particularly heavy in the vicinity of squares 1 and 2. Diagnostic artifacts were also collected and plotted. These included both projectile points and ceramics.

The net result of the test excavations and concurrent surface examination was the indication that 23BE337 had a high debris density on the surface, that debris extended below the plowzone in a portion of the site, that subplowzone debris densities in that portion of the site were high, and that among this debris was a larger quantity of ceramics than had been encountered to date in the Truman investigations. Since the site had obvious potential for helping revise chronology and provide evidence for the activity structure of an open-air, terrace-edge Woodland site, it was decided that larger scale excavations were warranted.

Excavations

An 8 x 8 m block was laid out on the flat of the terrace adjacent to Test Pit 1. An L-shaped portion of this block, including the north row and eastern two rows, was excavated (Fig. 2.8). Excavation proceeded in the same manner as in the test pits; that is, the plowzone was removed as a single unit with subplowzone deposits removed in 10 cm thick arbitrary levels. Most excavation proceeded by skim-shoveling and all fill was passed through 1/4" mesh screen.

Excavation units were designated by the coordinates of their northwest corners. These coordinates, in turn, were measured from the site datum established at the beginning of the test excavations. Excavation proceeded until sterile soil had been reached. Thus, the last level excavated in 11 squares in the east row of squares (along the 83E and 84E lines) was the 40-50 cm level, while the northern rows of squares were all excavated through either the 50-60 (7 squares) or 60-70 (4 squares) cm levels. One square, 60S 84E in the northeast corner of the block, was rapidly

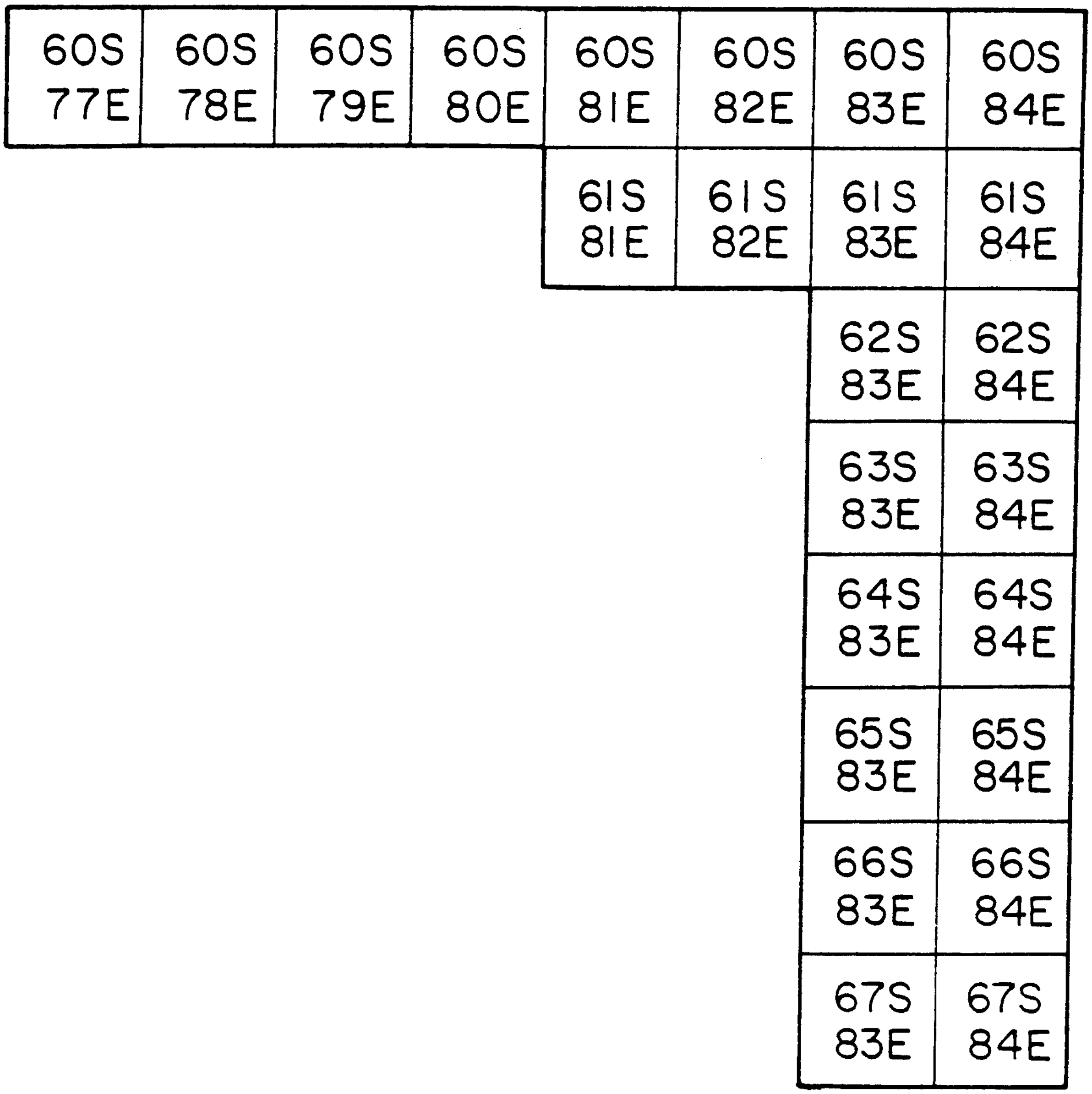


Figure 2.8. Plan of the 23BE337 Excavation Block.

excavated below 70 cm to a final depth of 150 cm BPZ. This was done to test for possible buried cultural horizons and examine the soil profile to a deeper level.

STRATIGRAPHY

Stratigraphy across the block was quite uniform (Fig. 2.9). The plowzone varied in depth from 19 to 33 cm, although usually it was between 19 and 26 or 27 cm thick. Its texture is a silt loam or clay loam that is dark brown (10YR3/3) or, occasionally, very dark greyish brown (10YR3/2) in color.

The zone immediately below the plowzone was described similarly to the plowzone. It was a generally dark brown fill, with a Munsell color of 10YR2/2, 10YR3/2 or 10YR3/3. Like the plowzone, it is described as silty, occasionally sandy. Expectedly, it is more compact than is the plowzone. This zone is generally around 20-30 cm thick and in places contains silands, light thin silt accumulations indicative of the incipient formation of an A_2 soil horizon characteristic of mature forest soils (Ruhe 1975).

Below this zone is a zone that is considerably lighter and is generally a reddish-brown color. It is uniformly 10YR4/3, gradually becoming 10YR4/4 at the bottom of the deep excavation in 60S 84E.

After the conclusion of the excavation, but prior to backfilling, the site was visited by Donald L. Johnson who was otherwise studying soils and soils-geomorphic relations in the reservoir area and was thoroughly familiar with the different alluvial sediments in the valleys. Soil color, texture and structure and the geomorphic placement of the units suggested that the lowest zone was Rodgers alluvium and that the terrace was a Holocene age T-1b. This Rodgers alluvium was in turn overlain by an overbank deposit of very recent (less than 1000 years) Pippins alluvium, represented by the plowzone and middle zone in the profiles. The edge of the Rodgers terrace was between the block excavation and Test Pit 2. This latter unit, placed on the terrace scarp face, in fact penetrated an inset of deep Pippins alluvium.

An additional 1 x 1 meter unit (Test Pit 6) was excavated at 118S 84E, or 50 meters south of the end of the excavation block (Fig. 2.2). The plowzone in this square was 25 cm thick and is described as a dark brown clayey soil (10YR3/3). The zone immediately below the plowzone (B in Fig. 2.10) was 20-30 cm thick and was more grey in color (10YR3/2) and more compact in texture. A large rodent disturbance extended from the base of this zone and intruded into the lower zone. This lower zone (C) was a lighter brown sediment with a hard compact clay.

Finger prints and slight nibbling of the working edge were observed on tool 228, a scraper. Tool 228 was assessed as having been used for transverse cutting on soft plant material. This interpretation is consistent with the evidence observed in the first experimental series for tools 846, 848, 856 and 274; all were used to cut soft plant materials.

For tool 230, a scraper, limited areas of polish were observed on the ventral surface. Finger prints were identified toward the proximal end. On the basis of these observations, tool 230 was interpreted as having been used to transversely cut hard bone. This is consistent with the use-wear observed for tools 731, 533 and 208 in the first experimental series; all were used to whittle bone.

Tool 232, a scraper, was assessed as having been used to transversely cut hard bone on the basis of minor polish and crushing observed on the dorsal face and a continuous band of polish near the edge on the ventral surface. This evidence is consistent with the use-wear observed on the tools from the first series listed for tool 230.

Nibbling and snap scars were observed along the working edge of tool 233, and fingerprints were identified in appropriate areas. No polish was observed. Tool 233 was interpreted as having been used to saw a soft, unidentified material. Its "use-wear" patterns were consistent with those observed on tools 241, 846, 565, and 228 in the first series and with the model for that action presented in Table 1.

Tool 242 was interpreted as being used for sawing hard wood on the basis of the crushing and scarring observed on its "working edge" and on the appropriate placement of a finger print. These were the same use-wear patterns observed for tools 809, 401, and 113 in the first series. All three tools were used for sawing seasoned oak.

Heavy crushing in the retouched area on tool 247 caused it to be interpreted as a tool used to transversely cut a hard unknown material. This was consistent with the crushing observed on tools 731, 533, 208 (whittle bone), 139 (plane antler), 730, 572, 141, 409 and 293 (plane wood), even though polish was also observed on some but not all of these tools.

A massively crushed projection caused tool 252 to be assessed as a tool used to grave hard bone. This pattern is consistent with those observed on tools 815, 516, 205 and 206; all were used to grave bone in the first experimental series.

Slight retouch or similar incidental damage on the edge of tool 253 caused it to be interpreted as a tool used to transcut soft plant material. This interpretation is consistent with the macroscopic use-wear damage observed on grass cutting tools 504 and 565.

Light polish and striations consistent with cutting actions (ventral) coupled with more well developed polish and a single large complex scar (dorsal) justified the interpretation of tool 256 as a tool used to cut soft meat and hard bone. The use-wear damage observed for multi-material tools 230, 127, 523, 151 and 277 supports this interpretation.

Slight nibbling on the edge of tool 258 led to the hypothesis that it was used for a short time to cut some soft unknown material. This interpretation is consistent with the use-wear observed on tool 155 used to cut meat in the first experimental series. The damage observed on tool 258 is a clearer indication of use for a short period on a soft material than that observed for blind test tool 270 which was used in that manner.

Ill-defined polish, finger prints and meat residue on the edge of tool 263 led to its interpretation as a tool used to cut soft meat. Although the meat residue is the determining factor in the interpretation, the remaining use-wear observed, in itself, is consistent with that observed for tool 290 in the first experimental series.

Partially Correct Identifications

In the same manner as that described for the eleven incorrectly identified tools discussed above, the partially correct identifications for the following seventeen tools act to identify and graphically illustrate the limitations of use-wear analysis. These tools speak to the ability of the use related evidence to reveal the actual modes of action, relative hardness and generic material utilized.

The question here is not whether utilization can be identified; each area utilized was correctly designated. Instead, it is whether the evidence of use can provide enough additional detail to enable an investigator to place the tools in a more detailed descriptive context such as that promised by the literature. The results of this phase of the blind test series suggest the capabilities of use-wear analysis are far more restricted, at least with these tools and materials, than had been expected.

Tool 231 was interpreted as a tool used for transversely cutting on hard wood. This interpretation was based on large stepped scalar scars localized on the ventral surface of its distal end and on very bright polish observed all along the

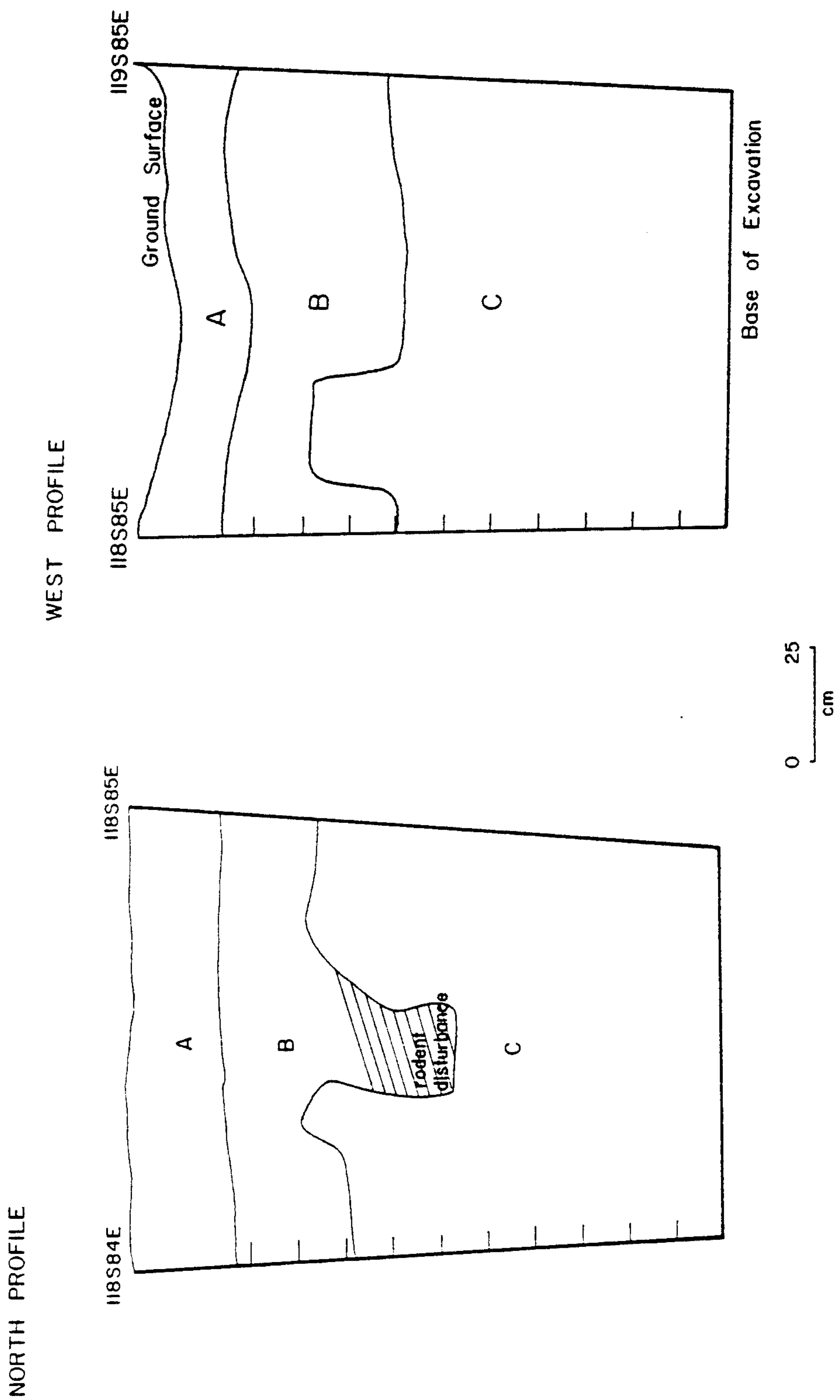


Figure 2.10. Profiles of test unit at 118S 84E.

texture. In color and texture, therefore, the profile of this unit was identical to that in the main block 50 meters to the north.

The Collections

CERAMICS

A total of 177 sherds was collected at 23BE337. Seventeen of these were from the surface, the remaining 160 were excavated (Table E-2.2). Of this total, only two sherds are rim fragments. Both are limestone tempered and cordmarked, and neither is decorated. The remaining 175 sherds are body sherds. The poor state of preservation precluded a determination of temper and surface treatment for 79 sherds. The temper in the other 96 sherds is crushed limestone. Twenty-one of these 96 sherds have smooth surfaces, 69 are cordmarked; the last six are indeterminate. None of the body sherds is decorated.

The ceramic assemblage from the site, even if not distinguished by decoration, is characteristic of the Late Woodland in the Truman Reservoir area and the Ozarks in general. Its limestone temper places it within the ware typically associated with the so-called Lindley Focus (Wood 1961) and other Highland Aspect manifestations in the Ozarks (Chapman 1980).

LITHICS

Projectile Points

The 23BE337 collection contains a total of 66 projectile points, 41 of which were from the surface and 25 of which were from the excavations (Table E-2.3). By far the largest single morphological group was the corner-notched points, of which 32 were found. Corner-notched points, therefore, comprise 48.5% of the projectile point collection from the site. Included in this aggregate are five Afton points (Categories 307, 313, 316, see Goldberg and Roper, Vol. II) and three specimens that are described as "Afton-like." These groups are generally considered to date to the Late Archaic. Five specimens are identified to within categories (Categories 310 and 311) that are variants on Cooper points and generally placed within the Middle Woodland period. Except for two specimens that were definitely corner-notched but are presently too badly damaged to further classify, the remaining 17 corner-notched points are placed within a series of classes created during the analysis of the Truman collections and dated partly on the basis of their position and associations at 23BE337. The majority of these are medium-sized and best described as dart points. They are similar

to dart points recorded in Stratum 4 at Rodgers Shelter (cf. Kay 1978) and date to the Late Archaic and Woodland periods.

Following corner-notched points in prominence, but considerably less well represented, are arrow points (9 specimens or 13.6% of the collection) and basal-notched points (8 specimens or 12.1%). Arrow points are largely fragments that cannot be more specifically identified because of breakage, but one each of Reed and Fresno points are included. All these points presumably date to the Late Woodland period. Seven of eight of the basal-notched points fall within the category of Truman Broad-Bladed points (Categories 327 and 328) named during the analysis of the Truman collections. These may date to the Late Archaic period.

The projectile point collections also include minor occurrences of lanceolate (1 specimen=1.5%), side-notched (5 specimens=7.6%), straight-stemmed (4 specimens=6.1%), contracting stemmed (2 specimens=3.0%), and unclassifiable points (5 specimens=7.6%). Unfortunately, most of these specimens were from surface context. Like their better represented counterparts in other morphological classes, most specimens, if they can be placed temporally, are known from the Late Archaic or Woodland periods.

Bifaces

The 23BE337 collection also contains 51 bifaces that are other than projectile points (Tables E-2.1, E-2.4). All but three of these are fragments. The unbroken specimens include one ovate, one triangular, and one circular specimen. Fragments of bifaces include seven pointed end segments, thirteen rounded end segments, seven squared end segments, one medial segment, and twenty fragments whose morphology is unspecified. These fragments occur no deeper than the 40-50 cm BPZ level. If the two sedimentary units in the block excavation at the site are separated at 20 cm BPZ, a simple tabulation shows that 14 biface fragments were found in the upper unit, i.e., the Pippins alluvium, while 26 fragments, as well as both whole bifaces are from within the lower unit or Rodgers alluvium.

Scrapers

Only 32 scrapers were recovered from the 23BE337 excavations, but they do represent much of the range of variability within scrapers from Truman Reservoir. Four of these scrapers are bifacial with convex working edges. This type of scraper is normally considered to represent a reworking of a biface that previously had a different function. The remaining 28 scrapers are unifacial and represent all

the major forms of working edge, including convex (8 specimens), concave (4 specimens), straight (5 specimens), spokeshave (8 specimens), notched (2 specimens), and irregular (1 specimen).

Like the bifaces, scrapers occur no deeper than the 40-50 cm level in the block, and also like the bifaces, they occur with greater frequency in the lower sedimentary unit than in the upper unit. Eight scrapers were found in the upper unit, or Pippins alluvium, while 16 were found in the lower Rodgers unit.

Other Chipped Stone Tools

Only seven chipped stone tools other than projectile points, bifaces or scrapers were found. These included four drills, one of which was found in the upper sedimentary unit of the block, one chopper and one cleaver, both found in the lower sedimentary unit of the same square, and one "knife" found in Test Pit 2.

Ground Stone and Hematite

Ground stone tools are infrequent in Truman Reservoir sites, particularly open sites and, predictably, are scarce at 23BE337. The SELGEM catalog lists fourteen pieces of ground stone or sandstone within the collection. None of these are characterized within any particular class such as manos or hammerstones.

A total of 28 pieces of hematite were collected, four from the surface, 24 from the excavations. This total includes eight worked pieces and twenty unworked pieces. Worked pieces include one tabular and two prismatic pieces made of specular hematite (see Roper and Van Ness, Vol. II for description), two tabular and 1 prismatic piece and two flakes of regular hematite. The unworked lumps of hematite include one piece of specular hematite, 15 pieces of ordinary hematite, and 4 chunks of limonite. Four fragments of ordinary hematite and 2 of the pieces of limonite are very soft, with hardness less than 2 1/2 on Mohs' scale.

Debitage

As always debitage was the most abundant lithics category at 23BE337. The number of pieces of debitage excavated from the test pits and excavation block totals 22,412, plus 15 cores. The distribution of the cores in the excavation block is shown with the tools on Table E-2.4, the debitage distribution in the excavation block is shown on Table E-2.5. Comparable figures for the test pits are given in Table E-2.1.

Shatter is the single most ubiquitous category with 7,551 pieces represented in the collections. This total

comprises 33.7%, by count, of the total debitage aggregate. Nearly as abundant, however, is miscellaneous rock, of which 7,457 pieces (33.3%) were tabulated. Flake fragments total 6,713 or 30.0% of the debitage collection.

Only 434 whole flakes were recovered, comprising 1.9% of the collection. The majority of these are tertiary flakes (338 specimens=77.9% of whole flakes or 1.5% of total debitage). Thirty-nine primary flakes (9.0% of whole flakes, .2% of all debitage), 36 secondary flakes (8.3% of whole flakes, .2% of all debitage), 9 modified flakes (2.1% of whole flakes, .04% of all debitage) and 12 trim flakes (2.8% of whole flakes, .05% of all debitage) complete the assemblage of whole flakes.

Minor amounts of debitage are chunks (254 specimens or 1.1% of debitage) and raw material (3 pieces or .01% of all debitage).

Chert type distributions are not given or analyzed in this report. However, a survey of chert resources within 1 km of the site was conducted in 1979 by J. H. Ray. Ray also compared the distribution of tool and debris chert types between components within the site and with availability for selected squares in the excavation block. His data and the results of his analysis are presented in Vol. II.

Dating

A large sample of dates from well-controlled context were submitted to Dr. Ralph M. Rowlett, U. of Missouri, for thermoluminescence dating and to Irene Stehli of Dicarb Radioisotope Company for radiocarbon age determination. The results are listed below and are also listed and commented upon in Vol. I, Appendix B.

THERMOLUMINESCENCE DATES

Sample: 23BE337-1
Provenience: 60S 78E, 0-10 cm BPZ
Date: A.D. 904 ± 97

Sample: 23BE337-2
Provenience: 62S 83E, 0-10 cm BPZ
Date: A.D. 854 ± 91

Sample: 23BE337-3
Provenience: 61S 83E, 20-30 cm BPZ
Date: A.D. 620 ± 110

Sample: 23BE337-4
Provenience: 67S 84E, 20-30 cm BPZ
Date: A.D. 634 ± 109

Sample: 23BE337-5
Provenience: 62S 84E, 40-50 cm BPZ
Date: 1374 ± 282 B.C.

Sample: 23BE337-6
Provenience: 61S 83E, 50-60 cm BPZ
Date: 3417 ± 437 B.C.

Sample: 23BE337-7
Provenience: 60S 79E, 30-40 cm BPZ
Date: 3600 ± 500 B.C.

Sample: 23BE337-8
Date: Sampled material insufficiently heated

Sample: 23BE337-9
Provenience: 61S 83E, 50-60 cm BPZ
Date: 3305 ± 500 B.C.

RADIOCARBON DATES

Sample: 23BE337-1336-1369 – DIC-1913
Provenience: 67S 83E, 30-40 BPZ, possibly feature fill
Date: 890 ± 125 B.P. (A.D. 1060 ± 125)

Sample: 23BE337-1303 DIC-1914
Provenience: 20-30 cm BPZ
Date: 940 ± 185 B.P. (A.D. 1010 ± 185)

Sample: 23BE337-1317 DIC-1915
Provenience: 67S 83E, 10-20 BPZ, possibly feature fill
Date: 110 ± 225 B.P. (A.D. 1840 ± 225)

DISCUSSION

With one exception (Thermoluminescence sample 23BE337-7) the thermoluminescence dates are stratigraphically consistent and supportive of one another. Similarly, two of the radiocarbon dates are consistent with one another; the third is very late. The thermoluminescence and radiocarbon series do not agree; however, the charcoal samples were taken from carbonized material within a possible feature. The top of this feature is decidedly ambiguous and it may well be intrusive from within the plowzone. The dated material would then be from the latest occupation at the site. It should be noted that both of the youngest thermoluminescence dates are within one standard deviation of the older of the two radiocarbon dates.

At face value, these dates appear to have implications for dating the alluvial sediments in which the cultural debris was deposited. Haynes (Vol. III) suggests that abandonment of the Rodgers terrace occurred after 1600 B.P.

and may have occurred after 1400 B.P. (A.D. 550). If the thermoluminescence dates are accurate and their associations valid, thermoluminescence dates 23BE337-3 and 23BE337-4 would suggest the abandonment of this terrace after A.D. 634 or 1346 B.P. Similarly, the abandonment of the Rodgers terrace and beginning of aggradation of the Pippins terrace (the modern floodplain) is bracketed by the thermoluminescence dates. The oldest date on Pippins alluvium received by Haynes is 840 ± 60 B.P. (TX-1434, see Haynes, Vol. III) or A.D. 1110. The two radiocarbon dates from 23BE337 are only slightly earlier than this date. The two youngest thermoluminescence dates, 23BE337-1 and 23BE337-2, are only slightly earlier than the radiocarbon dates and are arguably consistent with them. Overall, therefore, the dates are consistent with geochronological assessments in the Pomme de Terre valley and may well bracket the terrace interface slightly more tightly.

Intra-Site Distributions

VERTICAL

The cumulative evidence of ceramic distributions, projectile point distributions, lithic distributions, and dates suggests that at least three components are present at 23BE337. In this section, we present that evidence and define those components to the extent that it is possible to do so.

The table of ceramic distribution (Table E-2.2) shows that ceramics are found primarily within the plowzone and only in very minor quantities below the plowzone, Test Pit 2 being a conspicuous exception. Projectile points are also unevenly distributed. Certainly the largest number were collected from the surface, but this is largely because an effort was made to do so. Within the excavations, only three points, each of a different type, were collected from the plowzone. Seven specimens, of which three were so badly broken as to be unclassifiable, were collected from the 0-10 cm BPZ level. The four classifiable specimens fell into three different classes. No projectile points were recovered from the 10-20 cm level. A schematic of the types and their position is presented in Fig. 2.11. Distributions of lithic debitage, exclusive of miscellaneous rock, are similarly graphed, by square, in Fig. 2.12. These latter distributions are expressed as frequency of debitage within each square. These distributions normally show higher percent of debris in the plowzone, with lowered percent in the 0-10 cm BPZ level. The 10-20 cm BPZ level is variable. All these levels are within the Pippins Alluvium and are associated with thermoluminescence dates of A.D. 854±91 and A.D. 904±97 and with C-14 dates of A.D. 1010±185 and A.D. 1060±125. The ceramics and the presence of Scallorn and Reed arrowpoints

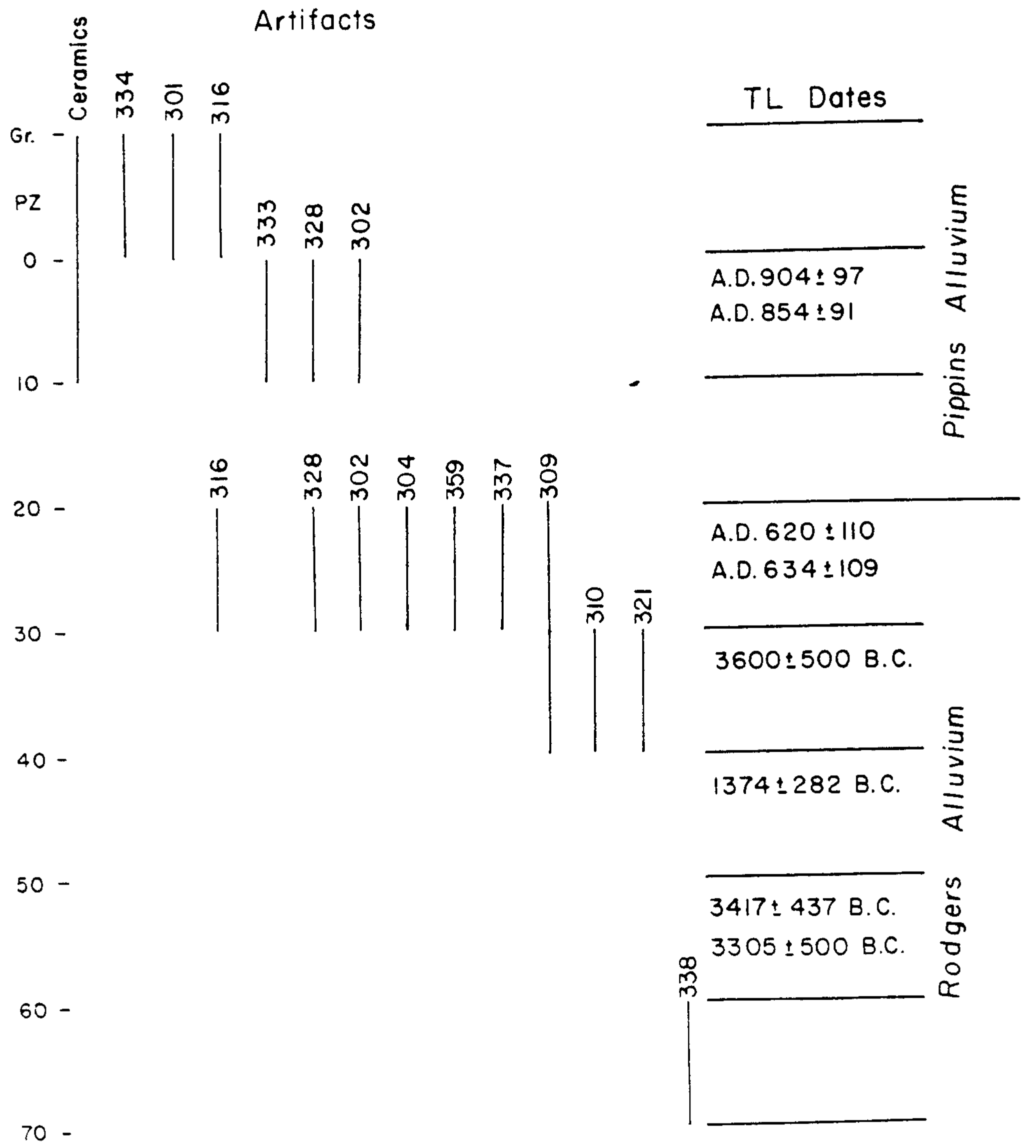


Figure 2.11. Projectile point, ceramic, and date distribution.

FIGURE NOT AVAILABLE

Figure 2.12. Lithic debitage distribution, by depth within each square at 23BE337.

are all compatible with these dates which also comport well with the alluvial chronology as extrapolated from farther upstream. This upper component, therefore, appears to have been a Late Woodland period occupation. Associated with this occupation are also projectile points within Categories 301 and 302, both of which were dated during the recent Truman mitigation project. The placement of the Category 301 specimen in particular in a Late Woodland complex is consistent with evidence from 23BE676, the Cootie Site, on the South Grand River. The association of the Afton and Truman Broad-Bladed projectile points is perhaps fortuitous. Specimens of each type are also found in a lower component. These forms are associated with each other at 23BE660, on the South Grand River, but are in a Late Archaic context at that site.

A second component occupies the upper portion of the deposits of Rodgers alluvium. Debitage associated with this occupation is normally found in greatest abundance in either the 20-30 cm BPZ or 30-40 cm BPZ level (Fig. 2.12). A variety of projectile point styles is associated with this occupation, including Afton, Truman Broad-Bladed, Categories 302, 304 and 309 dart points, a Cooper point, a Stone Square-Stemmed, and examples of the temporally unknown Categories 321 and 359. This list, therefore, includes types normally associated with the Late Archaic (Stone Square Stemmed and Afton) as well as forms associated with Woodland remains elsewhere (Cooper, Category 304, Category 309). The dates from this component are late Middle or early Late Woodland, A.D. 620±110 and A.D. 634±109. The date of 3600±500 B.C. from the 30-40 cm level is clearly out of place.

A third component (actually first in order of site occupation) is represented at the bottom of the excavation. Debris associated with this occupation is sparse (Fig. 2.12) and only a single projectile point was collected. This point is placed within Category 338 and presumably is associated with the dates of 3417±437 B.C. and 3305±500 B.C. obtained on materials from the next higher level. These dates for this type of point would be consistent with stratigraphic placement and the implications of co-occurrence of points in this category with other similarly aged specimens in surface collections.

HORIZONTAL

The upper, Late Woodland, component contained within the Pippins Alluvium contains not only the diagnostic ceramics and projectile points, but also an associated array of other artifacts, including 18 bifaces, 1 drill, 10 scrapers, 6 cores and 10 pieces of hematite. The horizontal distribution of these tools is shown in Fig. 2.13, while that for debitage is shown in Fig. 2.14.

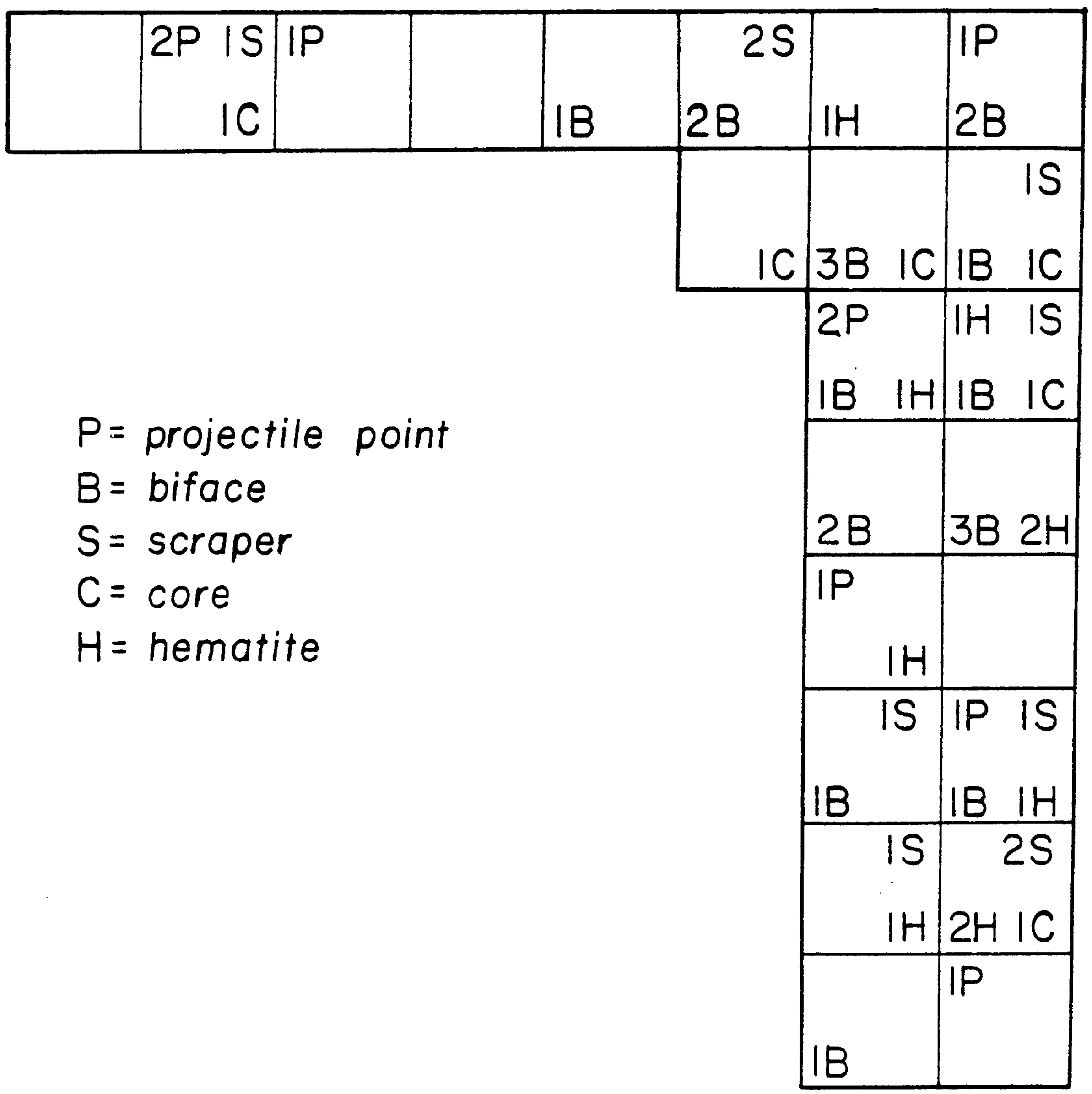


Figure 2.13. Horizontal distribution of tools in the upper component of 23BE337.

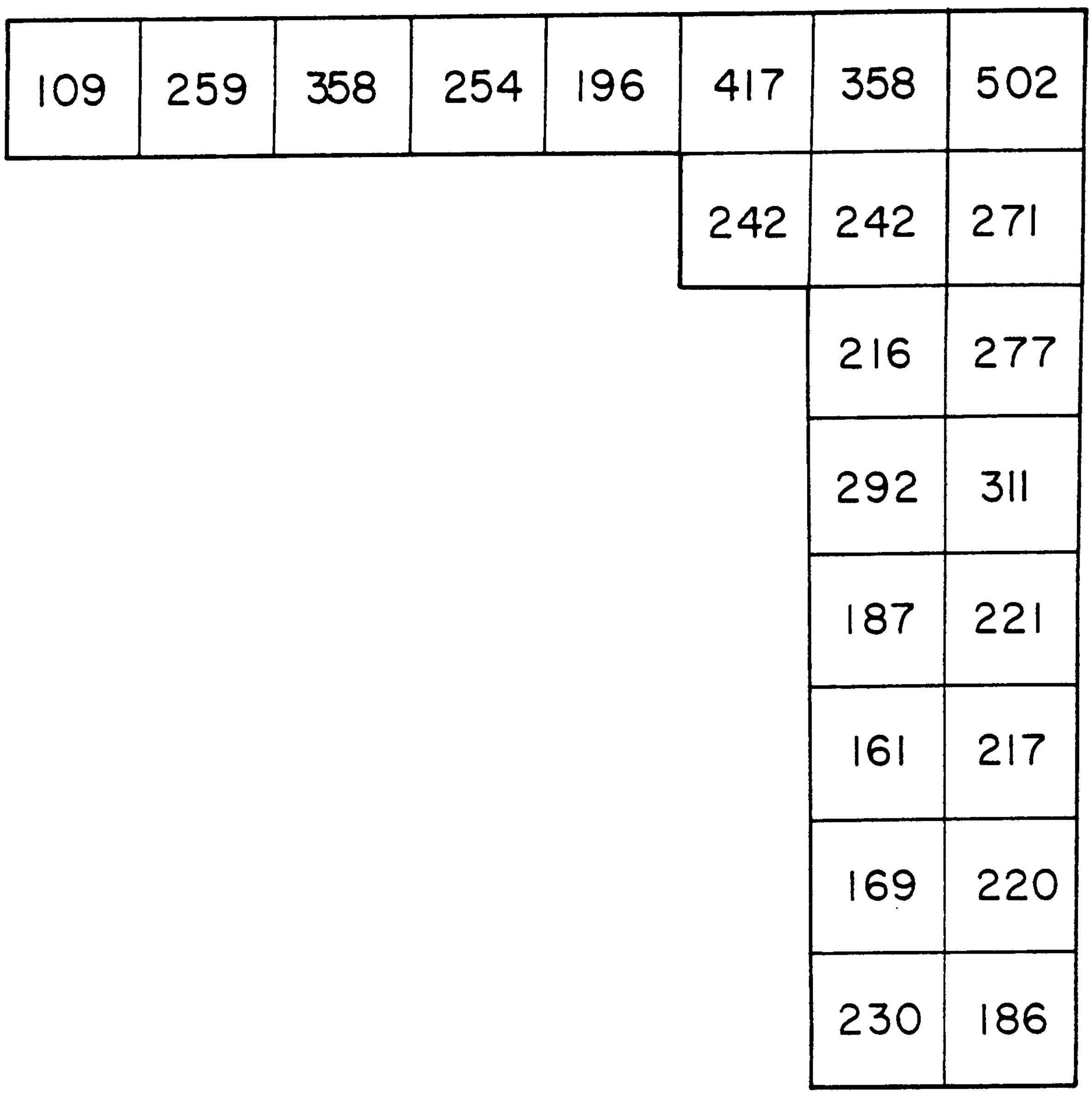


Figure 2.14. Horizontal distribution of debitage in the upper component of 23BE337.

Of major interest in the examination of the archeological remains is the internal structure of the remains. For this purpose, we here employ an approach to intra-site spatial analysis in which the form of distribution of artifact classes is first discerned, and the relations between those classes are then examined.

The form of distribution is examined using Variance/mean ratio values (this has been discussed in Part III, Chapter 2 of this volume to which the reader is referred for details and additional references). Table 2.1 presents the mean, variance, and variance/mean ratio for each artifact class present. For this purpose, the projectile points and the single drill are included among bifaces. Bifaces, scrapers, and hematite have random appearing distributions, while cores are dispersed throughout the block. Only ceramics and debitage show clustered distributions. This is expectable given that deposition of a sherd is not usually independent of the deposition of another sherd, nor is a flake likely to be deposited independently of another flake. Ceramic deposition likely represents only a few episodes of deposition of broken vessels or vessel sections, and debitage deposition likely reflects manufacture and/or maintenance activities which are likely to produce multiple flakes. The act of discard or loss of a tool, however, is far more likely to be a discrete event.

Table 2.2 shows the correlations of each artifact class with each other class within the block. Correlations are often used to aid in delineating activity sets, tool kits, an and the like. In this case, the computation of correlations suggests that the occurrence of most tools is not only independent of other members of its own class but is also independent of members of other classes.

The upper component at 23BE337 does not, therefore, exhibit a highly interpretable internal structure. Independent deposition episodes of portions of several ceramic vessels, manufacturing and maintenance debris and specimens of bifaces and scrapers argue for relatively casual use of this open terrace site during the Late Woodland period.

The middle component shows no more meaningful internal structure. A slightly larger number of tools, particularly bifaces, are present in the assemblage from this component and their distribution is shown in Fig. 2.15. Debitage occurs in about the same quantity as in the upper component (Fig. 2.16). Table 2.3 presents mean, variance, and variance/mean ratios for each debris category in the collections. Only debitage is strongly clustered, and of course, the reasons given above for this to be expected apply with equal force in this case. Bifaces, cores, and hematite show only a very slight tendency to cluster.

TABLE 2.1

Mean, Variance, and Variance/Mean Ratios for Debris Classes — Upper Component

Class	Mean	Variance	Variance/Mean
Ceramics	5.22	20.00	3.83
Bifaces	1.22	1.18	.97
Scrapers	.43	.44	1.01
Cores	.26	.20	.77
Hematite	.43	.44	1.01
Debitage	256.30	7746.22	30.22

TABLE 2.2

Correlation Among Debris Classes — Upper Component

	Ceramics	Biface	Scraper	Core	Hematite
Bifaces	-.09				
Scrapers	-.13	-.07			
Cores	.06	-.004	.37		
Hematite	-.22	.05	.27	.06	
Debitage	-.38	.42	.05	-.03	-.06

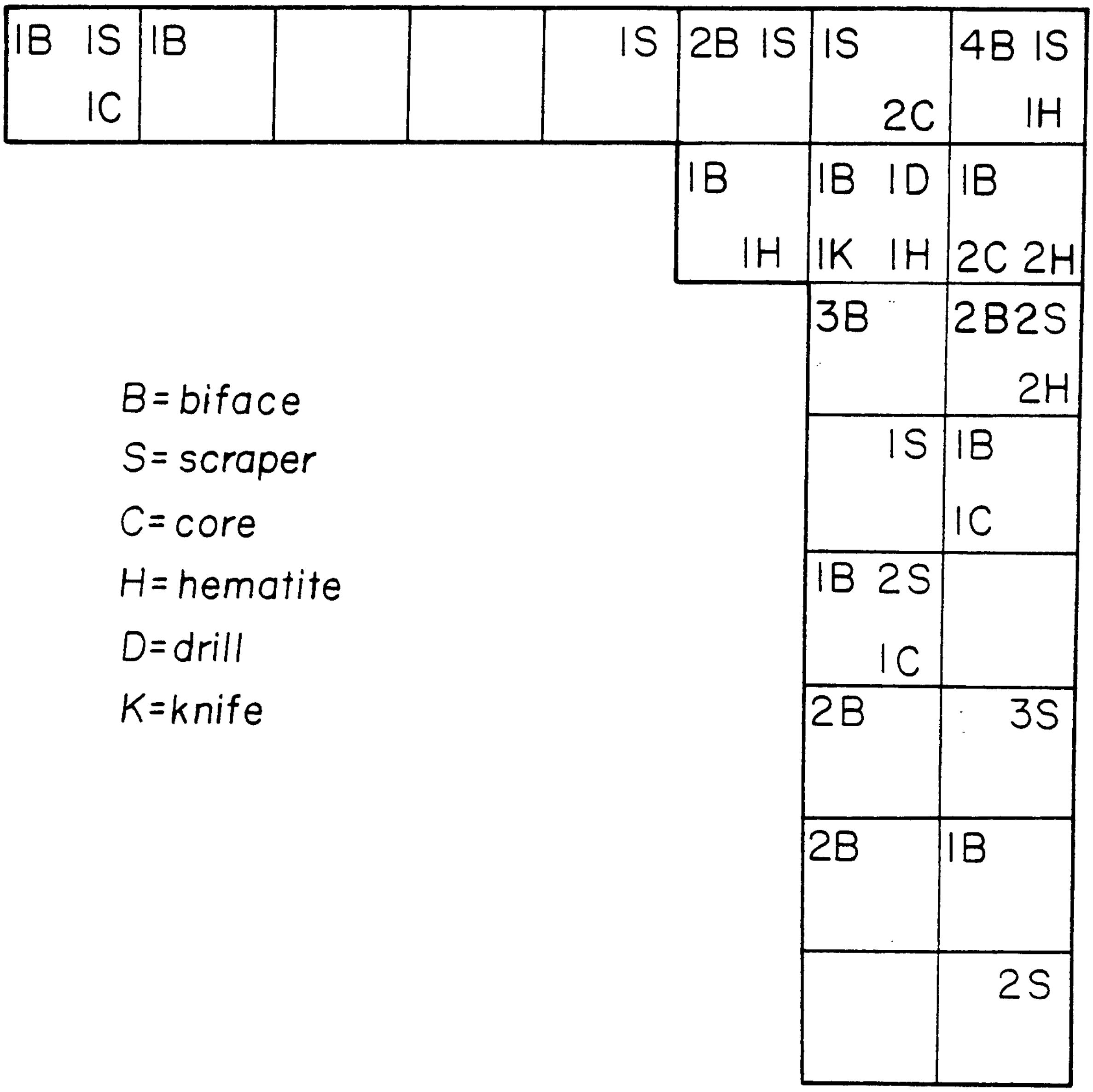


Figure 2.15. Horizontal distribution of tools in the middle component of 23BE337.

152	174	236	318	535	266	401	535
					239	346	450
						394	290
						225	259
						210	258
						177	191
						189	195
						101	199

Figure 2.16. Horizontal distribution of debitage in the middle component of 23BE337.

TABLE 2.3

Mean, Variance, and Variance/Mean Ratios for Debris Classes — Middle Component

Class	Mean	Variance	Variance/Mean
Bifaces	1.65	2.24	1.35
Scrapers	.70	.77	1.10
Cores	.30	.40	1.32
Hematite	.30	.40	1.32
Debitage	275.65	13862.42	50.29

TABLE 2.4

Correlations Among Debris Classes — Middle Component

	Bifaces	Scrapers	Cores	Hematite
Scrapers	.16			
Cores	-.07	.01		
Hematite	.55	.09	.21	
Debitage	.40	.01	.24	.41

Table 2.4 shows that in many cases the presence of an artifact is not only largely independent of the presence of another member of its own class, but also of the presence of members of other artifact classes as well. This is particularly true of scrapers and cores; bifaces, hematite and debitage show somewhat higher correlations.

Conclusions and Recommendations

The Terre Baby Site, 23BE337, was excavated beyond the stage of test excavations because it was clear that it had intact subplowzone deposits and the potential to yield information that would be useful for the study of chronology and settlement systems.

The results of the excavations were indeed useful for chronology building. A good series of thermoluminescence and radiocarbon dates was obtained. These dates bracket the geomorphic change from the Rodgers terrace to the modern floodplain; they are compatible with previous dates in the Pomme de Terre Valley but bracket this transition slightly more narrowly. Unfortunately, the associations with these dates are unclear. A large number of projectile points were collected. Corner-notched points were the most prominent in this series and the partitioning of their variability served as the prototype for a part of the projectile point classification devised by Goldberg and Roper for the entire Truman collection (Vol. II). Too many of these specimens were from the surface, however, and the excavated specimens were often limited to only one or two examples of each of a large number of classes.

Three components were identified: a Late Archaic, a Middle Woodland, and a Late Woodland. Only the latter two were intense. They are separated in time by only three or four centuries but are found in different sedimentary units. It was their geomorphic context and breaks in the dating sequence, not breaks in debris distribution, that were important in their delineation. Each of these two components has associated with it a large quantity of debitage but a rather sparse tool kit. A brief examination of the structuring of the debris distribution for each component suggests that the deposit is a rather random mixture of tools and debris.

The site was, of course, inundated within a few months of the termination of excavations. Even if this were not the case, however, it is doubtful that additional investigations would provide additional information. Useful data were gained, and the scope of the investigations is considered sufficient for the potential of this site.

References Cited

Allgood, Ferris P. and Ival D. Persinger
1979 Missouri general soil map and soil association descriptions. U. S. Department of Agriculture, Soil Conservation State Office, Columbia, Mo.

Chapman, Carl H.
1980 The archaeology of Missouri, II. The University of Missouri Press, Columbia.

Kay, Marvin
1978 Stylistic study of chipped stone points. In Holocene adaptations within the lower Pomme de Terre River, Missouri, edited by Marvin Kay, Chapter 8. Report to the U. S. Army Corps of Engineers, Kansas City District. Illinois State Museum Society.

Ruhe, Robert V.
1975 Geomorphology. Houghton Mifflin Company, Boston.

Wood, W. Raymond
1961 The Pomme de Terre Reservoir in western Missouri prehistory. The Missouri Archaeologist 23: 1-131.

PART IV

CHAPTER 3

SITE 23BE660

by

Donna C. Roper

Location and Background

Site 23BE660 was first recorded in late September 1976 during Stage 2 survey. It is in Transect 44 of Stratum 17, Lower South Grand River, as designated by the Stage 2 survey (Roper 1977: 144). The site is on the north bank of the South Grand River and is presently about 2 1/2 km downstream from the confluence of Tebo Creek with the South Grand River (Fig. 3.1). It is apparent, however, from both the topographic map and in-the-field investigations that Tebo Creek has shifted its course upstream, and it is possible that at the time of occupation Tebo Creek was much closer to the site.

The site is, therefore, currently located on the front edge of a terrace of the South Grand River at an elevation of 660' AMSL. This broad expanse of terrace extends to the west for about 2 1/2 km before being interrupted by the course of Tebo Creek. It extends to the north to the bluffs 4 km away and continues to the east, where it gradually narrows between the northeast-southeast curving bluff-line and the southwest-northeast curving course of the South Grand. Archeological site 23BE662 (or 23BE434), reported in Part III is 1 km south-southeast of and across the river from 23BE660.

Investigations – 1977

The original survey 1976 had resulted in a collection that included three projectile points identified as Snyders, Rice-Side Notched, and Scallorn (Roper and Piontkowski 1979). It was visited for resurvey and possible testing on June 6, 1977. At that time, the field had been plowed and recently planted and presented excellent surface visibility. Two additional projectile points were collected at this time. These are identified as a Truman Broad-Bladed (Category 328) and a "classic" Etley point (Category 341).

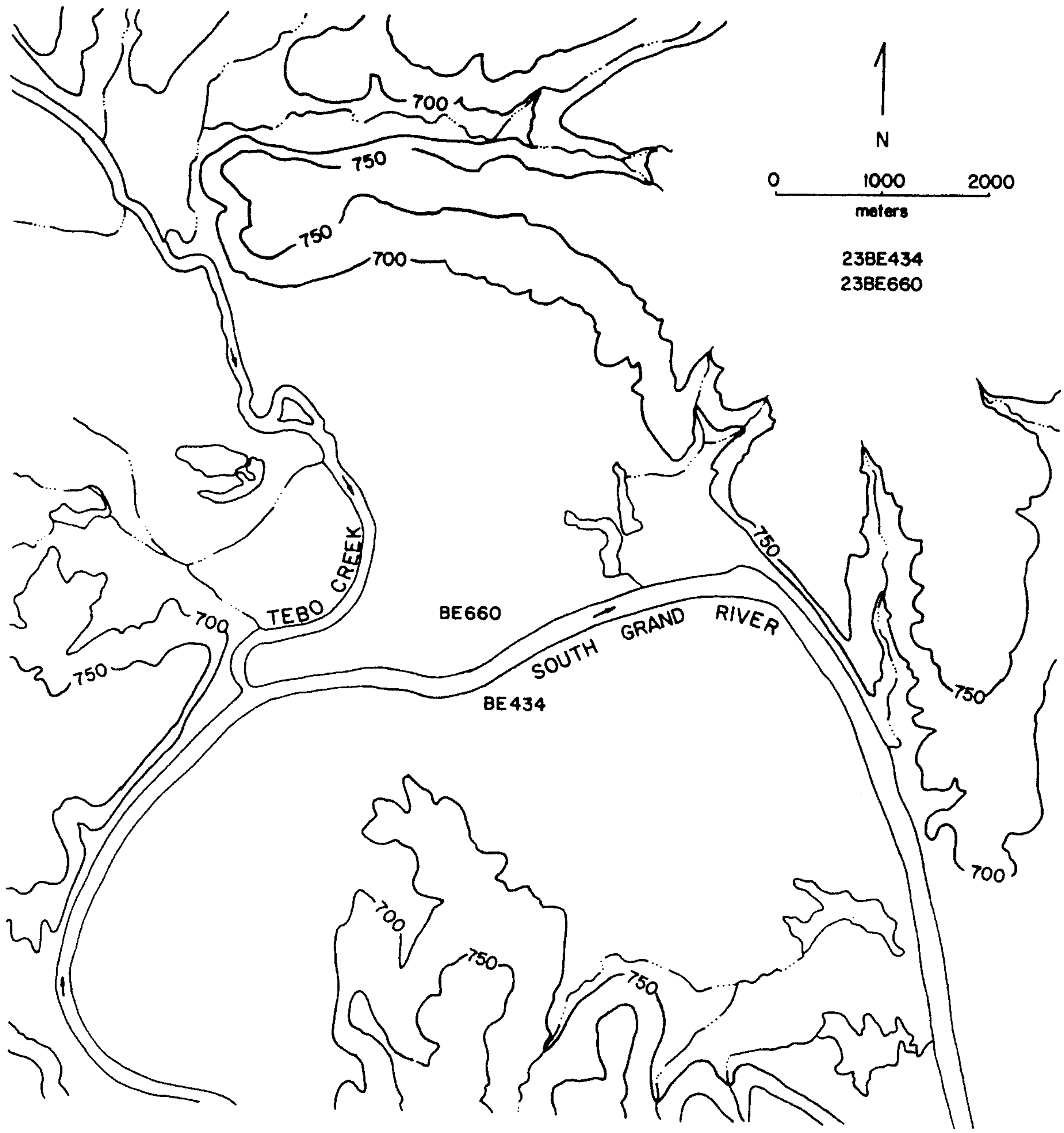


Figure 3.1. Location of Site 23BE660.

Test excavations were initiated on June 8, 1977 and were carried out from that date until June 17, 1977. We wish to thank Mr. George Miller of Sedalia, Missouri and Mr. Chad Gregory of Warsaw, Missouri, co-lessees of the land, for permission to excavate. Both men waived the offered crop damages.

A site datum was established in the woods beyond the edge of the field and was designated 100N 500W. This designation would ensure that all excavations were in the northwest quadrant of the imaginary grid and would simplify unit designations. Three test pits were laid out along the east-west baseline from the datum. These were placed at 100N 510W (Test Pit 1), 100N 530W (Test Pit 2), and 100N 560W (Test Pit 3). A fourth test pit (Test Pit 4) was later placed at 75N 560W, and Test Pit 5 was opened at 118N 490W. Provenience designations are from the northwest corner. All test pits measured 1 x 1 meter. The plowzone was removed as a single level, and excavation proceeded in 10 cm levels below that. All soil was passed through 1/4" mesh screen. Artifacts recovered in situ were individually plotted; other artifacts and all debitage were recorded in general levels.

An additional 5 m^2 were excavated subsequent to the initial test pits. These included four additional squares adjacent to Test Pit 2 which were excavated when it appeared that post-molds might be present in the subplowzone deposits of Test Pit 2, and an additional square adjacent to Test Pit 5, excavated because of a high debris density below the plowzone in Test Pit 5.

The investigations were prematurely halted after the end of the workday on 17 June 1980. Heavy rain began to fall late in the day and did not cease for more than a few hours until 26 June. The effect of this extraordinary rainfall was, of course, to drastically raise all nearby streams. An attempt was made to reach the site on 26 June, but the flooding precluded an approach closer than 1/2 mile before the waters crested. By mid-July, it was possible to reach the excavations, although not to drive to them. Flooding had, of course, thoroughly ruined the profiles of the not-yet completed test pits and made mapping impossible. The site map, shown here as Figure 2, was therefore drawn from plots made with a level and tapes. The cross-section was drawn from the Corps of Engineers 1:12,000 topographic maps with ten-foot contour intervals.

Stratigraphy and Features

Test Pit 1 (100N 510W) was placed just below the crest of the terrace scarp (Fig. 3.2). It was in the general vicinity of where the Etley and Truman Broad-Bladed points had been surface collected on June 6. The plowzone in this

FIGURE NOT AVAILABLE

Figure 3.2. Site map of 23BE660, showing locations of excavations.

square was described as dark brown clayey loam. Debris density was high compared to other sites in the Truman Reservoir.

The deposits below the plowzone are also light to medium brown clay loam, with some grey mottling. A single soil stain proved to represent a tree root or rodent burrow. Debris density was light in the two subplowzone levels that were excavated. No artifacts were recovered, and cultural debris was entirely limited to debitage.

The plowzone of test pit 2 (100N 530W) is described as brown in color and as having a "loose and crumbly loam" texture. It was measured as being 23 cm thick. The 60 cm of subplowzone deposits that were excavated are all described as light brown turning to a mottled brown clay loam. A feature, (Feature 1, Fig. 3.3) identified as a possible post mold, was recorded in the 0-10 cm BPZ (below plowzone) level. The stain from which this identification was made was 7 cm in diameter and was darker in color. Its clay content was higher than that of the surrounding matrix. Upon cross-sectioning, the feature tapered to a point but extended only 4.5 cm vertically.

Because of the feature present in the 0-10 BPZ level of Test Pit 2 and because lithic debris was present and clearly was below the plowzone, the square adjacent to the west was opened. This was originally designated Test Pit 2A but was later also referred to by its coordinates as 100N 531W. Like Test Pit 2, the plowzone was measured as 23 cm thick and was described as a brown loose and crumbly loam. The sub-plowzone deposits of the 0-10 cm level were a light brown clay loam. Feature 2 was recorded in this level. This feature was 7 cm in diameter and was darker in color and clayier in texture than the surrounding matrix. The feature was cross-sectioned, and it tapered to a diameter of 2.5 cm at a depth of 12 cm. It, therefore, exhibited all the attributes of a post mold. Unfortunately, this diagnosis was made in mid-afternoon. Upon reexamination in different light the next morning, the stain appeared to go in all directions and more probably was either a rodent disturbance or a tree root mold. Reexamination of Feature 1 in different light did not, however, lead to a change in its identification.

Test Pit 2B was opened diagonally to 2A and was designated by its northwest corner corrdinates as 99N532W. The plowzone in this unit, like that in other units, was 23 cm thick and was a brown loose loam. Like both units 2 and 2A, the end of the plowzone layer was quite distinct. The 0-10 and 10-20 cm BPZ layers were the light brown clay loam typical of the subplowzone deposits at this site. Feature 3 occurred in the 10-20 cm level of this square. It was

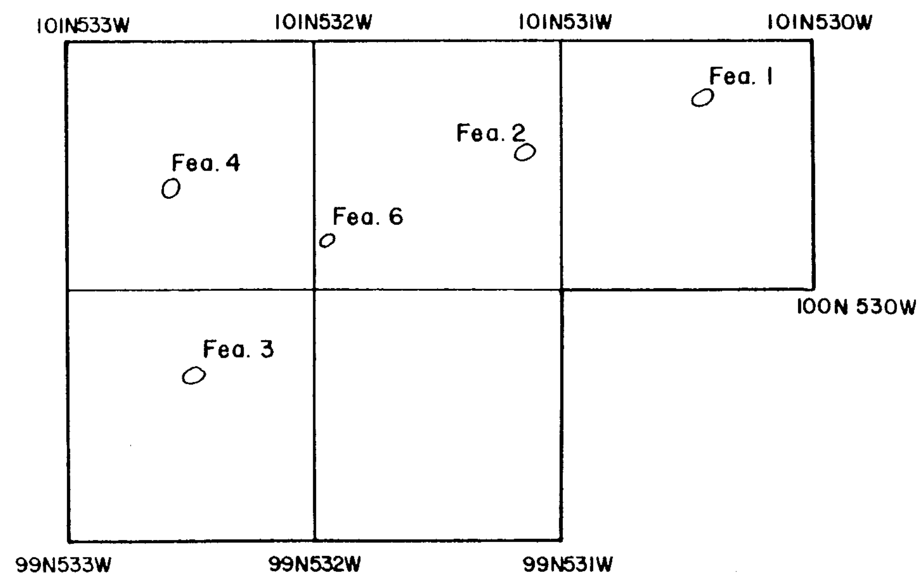


Figure 3.3. Map of excavation block at 23BE660, showing Features 1-4, 6.

initially recognized as an amorphous stain of about 7.5 cm diameter. It was cross-sectioned to a depth of 5 cm by which depth it had expanded to a diameter of 12 cm but had become more distinct. A 3 cm diameter ball of powdery sandstone was found in the center of this feature.

Squares 100N 532W and 99N 531W were opened to complete the microblock excavated in conjunction with the initial Test Pit 2. Three features had been recorded, only one of which had been definitely rejected as of cultural origin. Further, the excavation of the 0-10 cm levels in all three squares and the 10-20 cm level in one had shown that cultural debris was present in these subplowzone levels. It was intended to carry the excavations deeper and logistics demanded a larger horizontal area for working. The plowzone was, expectably, 23 cm deep, dark brown loam, changing to a lighter brown clay loam below the distinctly demarcated plowzone.

Feature 4 was encountered at the base of the plowzone (or the top of the 0-10 BPZ level). The cross-section of this feature revealed it to contain loose brown loam which was very crumbly; in essence, a fill similar to plowzone matrix. A hollow area was found in the center of the stain indicating that it probably was a rodent burrow. Further, the outline was indistinct in the cross-section.

A small area of burnt earth or oxidation mottling appeared in the 10-20 cm level of the northeast corner of 99N 532W. It was amorphously circular in outline and had a high clay content. It seems to have had no cultural significance. A feature number was not assigned.

Once all five squares had been excavated to approximately the same depth at either their 0-10 or 10-20 cm BPZ levels (the ground surface was not at a constant datum depth), excavations were continued in the whole block. Soil color was consistently described as a brown mottled clay loam or brownish grey clay loam.

Feature 6 was recorded in the 20-30 cm BPZ level of 100N 531W. It appeared as a 19 cm diameter circular stain and widened to 21 cm. Like Feature 3, it contained a large chunk of powdery sandstone. The stain was very dark in color.

Excavations were terminated at a depth of 60 cm BPZ in 100N 530W, 100N 531W, and 99N 532W. An additional level (60-70 cm BPZ) was excavated in 99N 531W. Square 100N 532W was, however, excavated to a depth of 200 cm BPZ to probe for deeply buried material and examine the stratigraphy of the natural deposits. Since the deposits were devoid of cultural material, excavation was done by shovel, without

levels and without screening. Such controls would, of course, be reinstituted upon the location of cultural material. Such material was, in fact, encountered at 140 cm BPZ when a light scatter of flakes was recovered. Debris was encountered, always in small quantities, to the bottom of the excavation.

The profile of this deep test was eventually drawn, but only after the torrential rains and flooding that occurred in late June 1977 (Fig. 3.4). The profiles of the other squares were also to have been drawn on 20 June but were slumped and eroded beyond repair when flood waters had finally receded sufficiently to allow access to the excavations. Given the uniformity of soil horizon descriptions for all other excavated squares, the profile shown in Fig. 3.4 may be confidently posited as representative of the stratigraphy in this part of the site.

Test Pit 3 was placed 30 meters due west of Test Pit 2, with its northwest corner at 100N 560W. The plowzone in this unit was measured as 25 cm thick. As is characteristic at the site, the plowzone matrix is described as brown loam. Only three flakes were collected from this unit. Because material was so sparse, excavations were not continued below the plowzone.

Test Pit 4 was placed at 75N 560W or 30 meters due south of Test Pit 3. In this position, it was again near the edge of the terrace. The plowzone is described as brown clay loam containing some chert flakes and pebbles. A biface was also found at the base of the plowzone. Excavation was continued in 10 cm levels to 70 cm below the plowzone. The deposits were a light brown mottled color and are described as being siltier than some of the other parts of the site.

Cultural debris continued to at least 60 cm BPZ and Feature 5 was first recorded in the 10-20 cm level. This feature was initially described as 3 cm in diameter. Upon cross-sectioning, it was observed to extend vertically and straight for 14 cm. Unfortunately, it then angled to the south and is probably an old tree root mold. Feature contents were a dark silty clay.

Test Pit 4 was also rapidly excavated for depth of deposits and to examine stratigraphy. Excavation proceeded without levels and without screening. These controls were, however, reestablished when flakes were once again encountered between 130 and 140 cm BPZ. The excavation had gone through the cultural material and reached 150 cm BPZ on June 17, after which flood damage precluded further work in this unit.

FIGURE NOT AVAILABLE

Figure 3.4. Profile of 100N 532W.

Test Pit 5 was placed at 118N 490W to the northeast of all other excavations (Fig. 3.2). Test Pit 5a was shortly added adjacent to it on the west at 118N 489W. The plowzone here was 27.5 to 29 cm thick and was described as dark brown loam. Debris density was relatively high. Subplowzone deposits from the base of the plowzone to the end of the excavation, at 40 cm BPZ in each square, are brown clay loam. Some soil mottling was observed. No features were recorded.

Natural deposits are virtually homogeneous across the terrace. The 23-29 cm deep plowzone is uniformly a dark brown loam (10YR3/2), while subplowzone deposits are normally described as a lighter brown (10YR4/3 – which in fact makes them quite reddish as well) and usually clay loam. This subsoil was well structured and thick clayskins were observed. The site was not visited by a geomorphologist, but verbal description to Donald L. Johnson, plus our own growing familiarity with the different alluvial sediments, suggests that this was certainly Rodgers alluvium. Such an identification is further corroborated by two separate pieces of evidence: (1) the topographic position of the terrace only a few meters above the river, and (2) the presence of archeological materials below the plowzone. These materials would not be present in an older age sediment; and a younger sediment would not have contained materials of even the relatively modest age of the 23BE660 materials. The Rodgers alluvium was likely topped by thin overbank deposits of the very recent (less than 1,000 years) Pippins alluvium. These overbank deposits were likely thinner than the plowzone and are consequently entirely observed within this upper zone. The loamy texture and 10YR3/2 color are both characteristic of Pippins and, as will be shown, the lower artifact density, all argue in favor of this interpretation. If, therefore, a thin layer of culturally sterile Pippins were present on top of the Rodgers, it would mean that a thinner band of the cultural deposits at the top of the Rodgers has been disturbed by recent agriculture.

The Collections

CERAMICS

Only a single sherd was recovered from 23BE660. It was found vertically oriented immediately below the base of the plowzone in Test Pit 5 and was in very fragile condition. It is thick, has bright red-orange colored paste and is tempered with crushed limestone.

PROJECTILE POINTS

A total of twelve projectile points have been collected from 23BE660. Seven of these are from the surface, the other five were recovered during the test excavations. Three

were identified in the original survey projectile point classification as Scallorn, Rice Side-Notched, and Snyders-like. Their provenience on the site is uncertain but appears to have been to the west of the area investigated in 1977.

Identifications to named classes were possible for all four surface specimens collected during the 1977 investigations. They include two Afton points, one Etley point and one Truman Broad-Bladed point. Exact provenience was recorded for all specimens and is shown in Fig. 3.5.

Five specimens were collected from the excavations. These include two Truman Broad-Bladed and one Category 355 point, all from the small group of squares opened with Test Pit 2, and a Rice Side-Notched and Afton point, both from Test Pit 5. Horizontal provenience is also shown in Fig. 3.5. The interpretation of the distribution will be made below.

OTHER CHIPPED STONE TOOLS

Other than the single ceramic sherd, all cultural material from 23BE660 was lithic and was predominantly chert. A total of 66 chipped stone tools were recovered, exclusive of projectile points. This total includes 25 biface fragments, 2 "Sedalia diggers," 1 perforator, 33 scrapers, 1 graver, 1 denticulate, 1 cleaver, and 2 blanks. The distribution of these tools is shown in Table E-3.1; their chert type identifications are given in Table E-3.2.

The twenty-five biface fragments include seven pointed fragments that could either be distal portions of projectile points or fragments of other types of pointed bifaces. Six fragments are rounded segments, the remaining twelve are either amorphous in shape or were not identified to shape by the lithics analysts.

The two "Sedalia diggers" recovered in Test Pits 5 and 5a (118N 490W and 118N 489W, see Table E-3.1) are the only unbroken bifaces recovered from this site. These artifacts are both relatively large, rectangular, bifacially worked tools with moderately steep bits and corn gloss on the bit (cf. Chapman 1975).

The thirty-three scrapers represent both end scrapers, side scrapers, and general scrapers with a variety of working edge configurations (Table E-3.1), including notched spokeshave, concave, convex, straight, and irregular. Most scrapers are unifacial and are made on tertiary flakes.

LITHIC DEBITAGE

The catalog of collections from 23BE660 lists 4,306 pieces of debitage, only 63 (1.46%) of which were collected

FIGURE NOT AVAILABLE

Figure 3.5. Projectile point distribution.

from the surface. These are tabulated in classes of flakes, (primary, secondary, tertiary, each modified or unmodified), flake fragments (also primary, secondary, tertiary, and modified or unmodified), blades, shatter, chunks, and cores (Table E-3.3). Chert type identifications are available for individual pieces; however, lack of time and a greater interest in interpretation of intra-site distributions and site function precluded tabulation of these identifications here. A subjective estimate is that chert type was indeterminate for around half of these pieces. These data are available, however, and a later tabulation would allow actual chert utilization to be compared with that predicted by Ray (Vol. II) from his survey of chert resources within 1 km of the site.

Examination of the types of debitage suggests that most chert debris is from later stages of manufacture. In the first place, only 10 cores are identified. These together comprise a mere .23% of all debitage. Flakes, flake fragments, and blades together account for 2,657 pieces or 61.7% of all debitage. Breaking this into types of flakes leads to a further suggestion that tool manufacture was primarily comprised of the later stages of reduction. Ignoring for the moment whether or not a flake was modified and whether or not it is fragmentary, all flakes may be tabulated as primary, secondary, or tertiary. Such a tabulation shows that of 2,652 flakes or flake fragments, only 44 or 1.71% are primary, 146 or 5.45% are secondary, and 2,462 or 92.84% are tertiary.

Very little debris had been modified. Of the 2,652 flakes and flake fragments, only 80 or 3.02% had been modified. Little preference was expressed for types of flakes that were modified or retouched. A chi-square comparison of reduction stage of flake and whether or not a flake was modified gave a value with a probability of between .05 and .10 of occurring by chance (X^2=5.59, DF=2). A few more primary and secondary flakes are modified than might be expected by chance, however.

HEMATITE

Virtually the only other raw material used and preserved at 23BE660 was hematite. Twenty-four pieces of hematite were found, including 13 unmodified and 11 modified pieces. All unmodified hematite from 23BE660 is what Roper and Van Ness (Vol. II, Pt. III) have referred to as ordinary hematite. It is all of hardness between 2 1/2 and 5 1/2 on Mohs' scale. Ten of the 13 pieces weigh less than 1 gm, one weighs 5.2 gm, and the last two weigh 67.4 and 75.0 gm respectively. These last are among the largest unmodified pieces from Truman Reservoir sites.

Modified pieces of hematite include five tabular pieces, four prismatic pieces, one piece that has been flaked, and one flake. The flaked piece at 158.7 gm is the larger of two flaked pieces in the Truman hematite collections; the flake at 56.3 gm is the largest of 11 hematite flakes in the Truman collections. Both are of ordinary hematite with a hardness between 2 1/2 and 5 1/2 on Mohs' scale. Both are, unfortunately, from the surface.

The nine rubbed pieces range in weight from 1.0 to 10.4 gm. One piece is of specular hematite with a hardness between 2 1/2 and 5 1/2. Eight pieces are of ordinary hematite, three have hardness less than 2 1/2, five have hardness between 2 1/2 and 5 1/2 and the ninth is of hardness greater than 5 1/2 on Mohs' scale.

The Age of the Deposits

The identifications of the artifacts from 23BE660 suggest the presence of two minor and one major component at the site. The uppermost component is represented in Test Pit 5 and 5a by a Rice Side-Notched point and a single limestone-tempered sherd. These artifact types frequently co-occur and suggest a minor Late Woodland occupation at 23BE660. This suggestion is further enhanced by the identification of Rice Side-Notched and Scallorn points in the collections from the original survey. All the Woodland material is from the surface, the plowzone or immediately below the plowzone and is confined, in the 1977 investigations, to Test Pit 5 and 5a.

The most intense occupation is that represented in the upper 60 cm of the deposits in the microblock, Test Pit 1 and Test Pit 4. Tools representing a fairly large portion of the diversity present in Truman Reservoir, several projectile points, a large amount of debitage, and an unusual amount of hematite are present. Several features appeared but are rejected as being of cultural origin. The projectile points are identified as Truman Broad-Bladed (2 specimens) and one Category 355 point. A third Truman Broad-Bladed, an Afton point, and an Etley point were found on the surface on the slope of the terrace near Test Pit 1. A second Afton point was found on the surface between Test Pit 4 and the microblock.

The Etley and Afton points are clearly Late Archaic (see Goldberg and Roper, Vol. II, Pt. I for discussion). Category 355 points are associated with a thermoluminescence date of 4200 B.P. at 23SR675, placing them also within the Late Archaic period. Truman Broad-Bladed points are less clearly dated. A thermoluminescence date of 2929 B.P. was obtained from a heat-treated Truman Broad-Bladed specimen at at 23HI297. Another thermoluminescence reading on another

Truman Broad-Bladed specimen, also from 23HI297, gave a date of 1744 B.P. These points could represent a Late Archaic occupation, an identification totally consistent with their association. For the present, the major occupation at 23BE660 is considered to be Late Archaic. No absolute dates were, however, obtained at this site.

The third clearly delineated occupation is that represented in the 140-200 cm BPZ levels of 100N 532W and the 110-150 cm BPZ levels of Test Pit 4. This occupation is light and has no tools, projectile points or other form of diagnostic artifacts associated with it. Its stratigraphic position nearly 1 meter below the Late Archaic occupation would suggest that this component predates 4000 B.P. Its context within the Rodgers alluvium would suggest that it post-dates 10,500 B.P. Further temporal assignment is impossible.

Intra-Site Distributions and Comparisons – Upper Component

Several overall patterns may be noted and quantified for the distribution of debris at 23BE660. These include both the vertical distribution of debris and the delineation of zones of occupation and a horizontal differentiation of debris distributions.

VERTICAL DISTRIBUTIONS

Field impressions, as recorded in the field notes, suggest that debris distributions in Test Pit 2 and associated group of squares in particular are highest several levels below the base of the plowzone. This is also true in Test Pit 4 but is decidedly not the case in Test Pit 1 where excavations were terminated only 20 cm below the plowzone because the matrix was virtually devoid of cultural material.

To quantify these impressions, the percent of the debitage was calculated for each level of Test Pits 1 and 4 and the five squares in the Test Pit 2 area. These calculations were then expressed as histograms (Fig. 3.6). The debris mode for Test Pit 1 is the plowzone, from which 96.6% of the debitage was collected. In no other square was this again the case, an observation made all the more remarkable by the fact that the plowzone is 2.3 times as thick as each other level. Highest debris density occurred at 0-10 cm BPZ in Test Pit 2 (100N 530W), in the 10-20 cm BPZ level in 100N 531W, 99N 531W, and 99N 532W, in the 20-30 cm BPZ level in 100N 532W, and in the 40-50 cm BPZ level in Test Pit 4. Some squares (100N 530W, 100N 532W, and 99N 532W) showed secondary modes of debris at lower depths (Fig. 3.6).

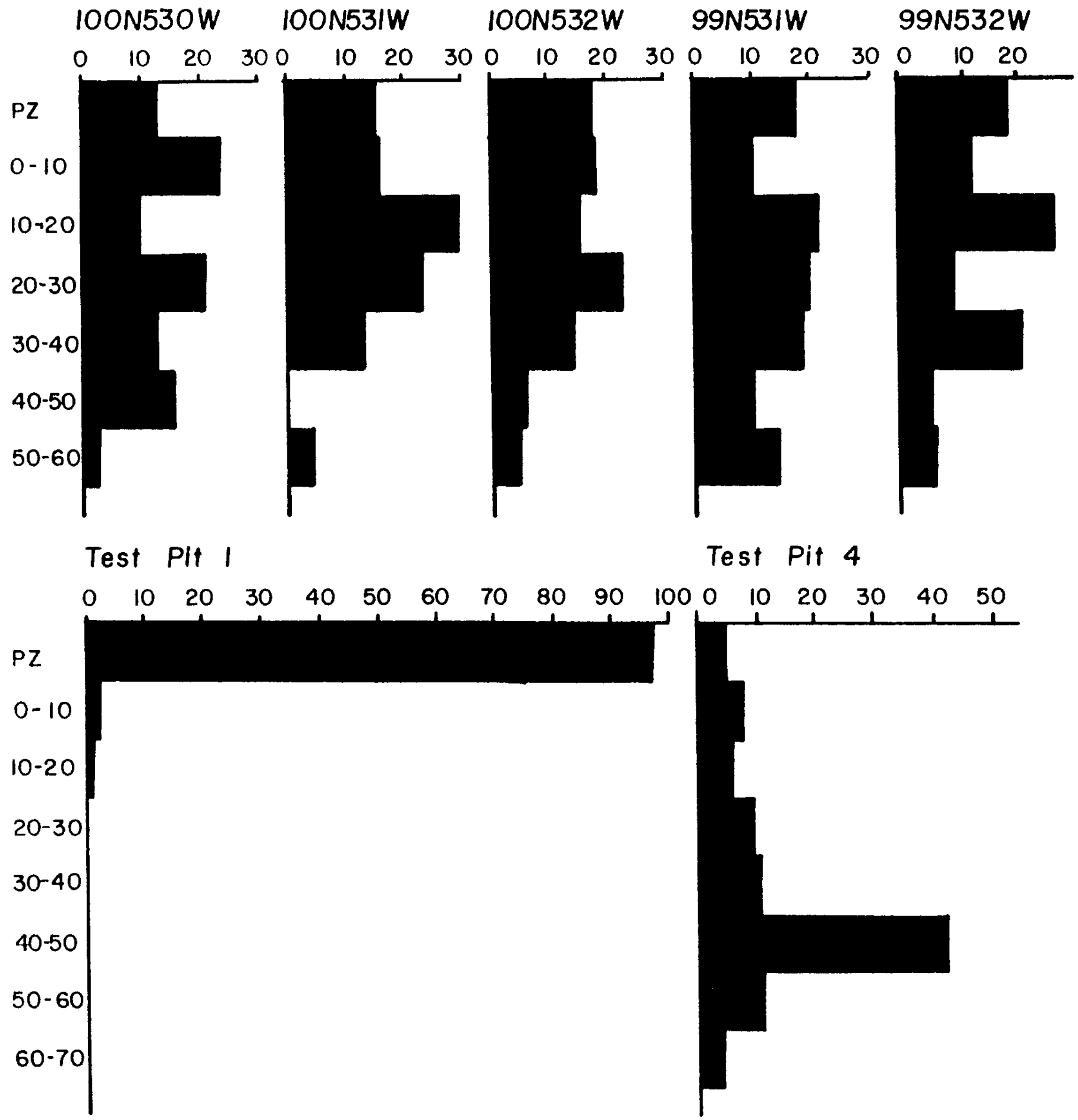


Figure 3.6. Vertical distribution of debitage.

In Figure 3.7 these squares are shown against a cross-section of the site. Test Pit 4 has been projected onto this cross-section and the horizontal scale has been shortened for illustrative purposes. It can be seen from this figure that the plowzone level of Test Pit 1 is at approximately the same absolute elevation (measured by datum depth) as the debris peaks in the squares on the flat of the terrace.

Taken together, Figures 3.6 and 3.7 suggest that the major occupation level at 23BE660 is 10-30 cm below the plowzone, or 33 to 53 cm below the present ground surface in the vicinity of the microblock surrounding Test Pit 2, and 40-50 cm BPZ (or 63-73 cm below present ground surface) at Test Pit 4. Gradual erosion on the scarp face of the terrace has cross-cut the cultural deposits. The high debris density in the plowzone of Test Pit 1 (a density equal to 2122 pieces of debitage per cubic meter compared to an average of 226 pieces of debitage per cubic meter in the Test Pit 2 area) can probably be attributed to not only debris exposed at that level, but also to deflation and downhill transport of materials from higher on the terrace face.

Occupation surfaces may be thin deposits of tools and debris at the time of their occupation, but it is very often the case that they do not remain as such. Over the past decade, archeologists have increasingly come to realize that materials are moved both up and down through a profile, by a multitude of processes, including trampling, frost heaving (cryoturbation) and argilliturbation (shrinking and swelling of clays). Observations of the vertical distribution of mean flake weights and later experiments by E. D. Stockton showed that trampling had the effect of sorting debris such that mean weight decreased with depth (Stockton 1973: 116).

Benedict's plotting of the vertical distribution of artifacts and their mean sizes and weights at the Hungry Whistler Site is an excellent example of the effects of frost heaving on artifact movement in archeological context. Hungry Whistler lies at an altitude of 3500 m (nearly 11,000 feet) in the Colorado Front Range. It is, of course, subjected to severe frost action. Benedict's (1978: 43) plotting clearly shows that the larger objects (projectile points, tools, grinding tools) have risen to the surface at a considerably greater rate than have the much smaller flakes.

Wood and Johnson (1978: 355-358) have cited a study done in California where stones and artifacts were differentially heaved by shrink-swell processes in vertisols. In the cited study, boulders and cobbles were raised to the surface, while the smaller artifacts and pebbles were displaced downward in the profile. Duffield (1970) has also discussed the implications of shrink-swell action for archeological stratigraphy.

FIGURE NOT AVAILABLE

Figure 3.7. Cross-section of site, showing relative elevation of test pits.

Any of these three processes, trampling, cryoturbation, or argilliturbation, could have been active at 23BE660. The occupation may not have been long-lived but was surely of sufficient duration to produce effects of trampling. Stockton's experiment, cited above, lasted for only a day. Trampling is described only as "indiscriminant" (Stockton 1973: 116) and presumably no special efforts were made to produce extraordinary amounts of foot traffic over the experimental plot. Freeze-thaw cycles in the Truman Reservoir area are certainly not as severe as in the Front Range, but freezing weather does occur and the ground does become frozen, even if for only short periods of time. The alluvial soils of the Osage Basin have a high clay content. These soils are, in fact, not vertisols; however, limited available clay mineralogy data have shown that clays from sediments virtually identical to those at 23BE660 may be 65-70% or more montmorillonite. These sediments would thus have moderately high shrink-swell potential.

All three of these vertical displacement processes would be likely to produce a similar distribution pattern, viz., upward movement of larger particles, particularly those oriented horizontally, and downward movement, or less movement, of small particles. Data are available to examine particle size distribution at 23BE660 to look for potential disturbance of the occupation level.

Two squares in the microblock were selected for this analysis, 99N 532W and 100N 531W. Size grade data were tabulated for flake fragments (the only category size graded in the lithics laboratory), by depth in each square (Table 3.1). These data were then converted to chi-square values to express their proportional representation, overrepresentation, or underrepresentation at each level. (Chi-square values are, therefore, not computed as a test criterion but rather as a means of standardizing values across disparate sample sizes. They function analogously to standard, or Z, scores with continuous data and are more accurate than percentages, which can be misleading with small sample sizes.)

The results are notable (Table 3.1). The smallest flakes (size grade 1) are underrepresented above the 20-30 cm level and generally overrepresented at the lower levels. Larger flakes vary but are more often underrepresented in the lower levels and occasionally appear overrepresented in the upper levels. Conspicuous exceptions occur in the 50-60 cm BPZ level and the largest size class (6) in each square. In each case the high chi-square values are produced by a single flake.

Overall, the vertical distribution data from Test Pits 1, 2, and 4 and the four additional squares excavated adjacent to Test Pit 2 suggest that the Late Archaic component

Table 3.1

Size Distributions by Depth of Flake Fragments in Two Squares

Level	Size Grade 1	2	3	4	5	6	Total
99N 532W - Frequencies							
Plowzone	7	20	6	2	1	1	37
0-10	3	3	5	2	0	0	13
10-20	4	10	7	2	1	1	25
20-30	8	3	4	2	0	0	17
30-40	26	15	2	0	0	1	44
40-50	5	3	0	0	0	0	8
50-60	1	0	0	1	0	1	3
Total	54	54	24	9	2	4	147
99N 532W - Chi-Square Values							
Plowzone	-3.2	+3.0	-.0003	-.03	+.5	-.0001	
0-10	-.7	-.7	+3.9	+1.8	-.2	-.4	
10-20	-2.9	+.1	+2.1	+.1	+1.3	+.2	
20-30	+.5	-1.7	+.5	+.9	-.2	-.5	
30-40	+6.0	-.1	-3.7	-2.7	-.6	+.03	
40-50	+1.4	+.001	-1.3	-.5	-.1	-.2	
50-60	-.01	-1.1	-.8	+3.6	-.04	+10.3	
100N 531W - Frequencies							
Plowzone	3	8	2	1	0	0	14
0-10	3	10	5	2	0	0	20
10-20	4	15	6	0	1	0	26
20-30	13	8	3	1	1	0	26
30-40	8	7	1	0	0	0	16
50-60	1	2	2	0	0	1	6
Total	32	50	19	4	2	1	108
100N 531W - Chi-Square Values							
Plowzone	-.3	+.4	0.1	+.4	-.3	-.1	
0-10	-1.4	+.1	+.6	+2.1	-.4	-.2	
10-20	-1.8	+.7	+.4	-1.0	+.6	-.2	
20-30	+3.6	-1.4	-.5	+.001	+.6	-.2	
30-40	+2.2	-.02	-1.2	-.6	-.3	-.1	
50-60	-.3	-.2	+.8	-.4	-.2	+16.1	

was originally expressed as a discrete occupation layer. The occupation occurred subsequent to the major deposition of the T-1b on which the occupation occurred, but yet prior to its final stabilization and later abandonment. A thin overbank deposit of the later T-0 sediments may have been laid down on top of the terrace and in this area of the site was probably culturally sterile. A combination of processes, that may have included, but not necessarily been limited to, trampling during the time of occupation, and subsequent cryoturbation and argilliturbation then disturbed the vertical context of the occupation, raising some pieces of debris through the profile, and causing the lowering of others. Some of this material was moved, if not to the surface, at least to within the upper 23 cm of the profile. Here is has been further subjected to vertical displacement by agricultural activity. At the same time, lateral erosion on the scarp face of the terrace has exposed the cultural level, deflating it by stripping away the soil particles but leaving the cultural debris and probably transporting higher material down the slope face.

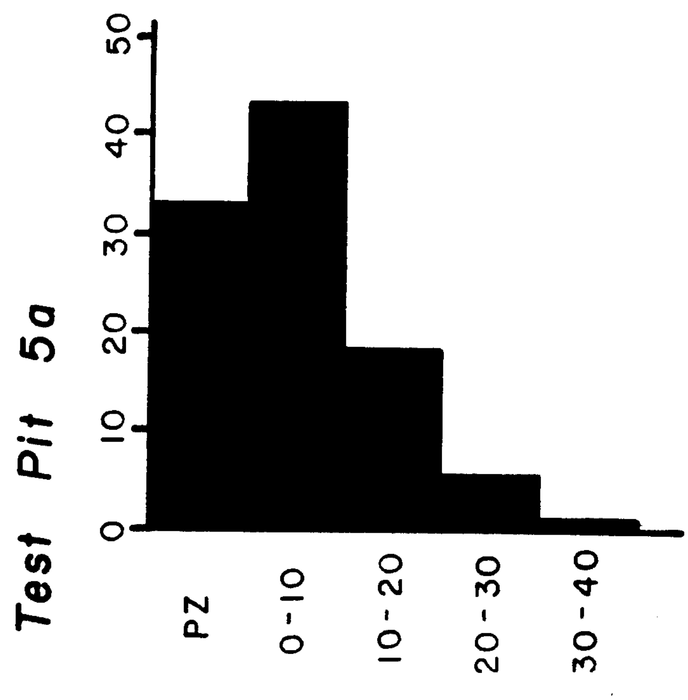
Test Pits 5 and 5a may represent the same stratigraphic situation but do so less clearly. Debris density in these two squares is considerably higher than in all other squares except Test Pit 1 (an average density of 1500 pieces of debitage per m^3). Modal distribution in both squares was in the 0-10 cm BPZ level. The next highest density was, in fact, in the plowzone. Density remained high in the 10-20 cm BPZ level, but it fell sharply below 20 cm BPZ (Fig. 3.8).

It is probable that the major occupation layer in this portion of the site originally was in a position slightly below the base of the modern plowzone. Disturbance processes, including plowing, have subsequently disturbed the occupation. Some deflation of deposits may also have occurred.

HORIZONTAL DISTRIBUTION

The extent of the excavations is such as to make analysis of horizontal distributions largely meaningless. Figure 3.9, however, plots frequencies of bifaces, including projectile points, scrapers and miscellaneous other unifacial tools and hematite. These plots disregard the level from which individual pieces were recovered.

It has already been noted that debitage densities vary considerably across different parts of the site, with particularly disparate values in the Test Pit 2 microblock area, Test Pit 1, and Test Pits 5 and 5a. While these might indicate differential occupation intensity, the case has been made for different geomorphic processes involved in the formation of the archeological record as observed



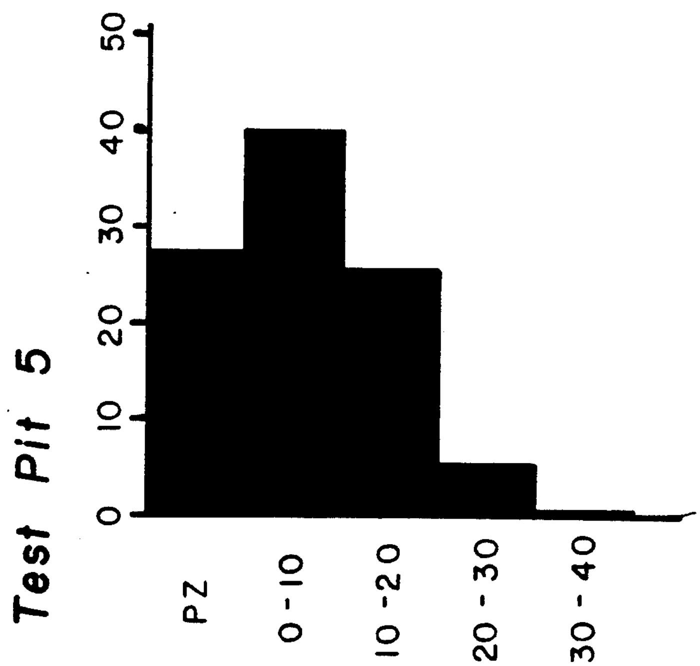


Figure 3.8. Debris distribution in Test Pits 5 and 5a.

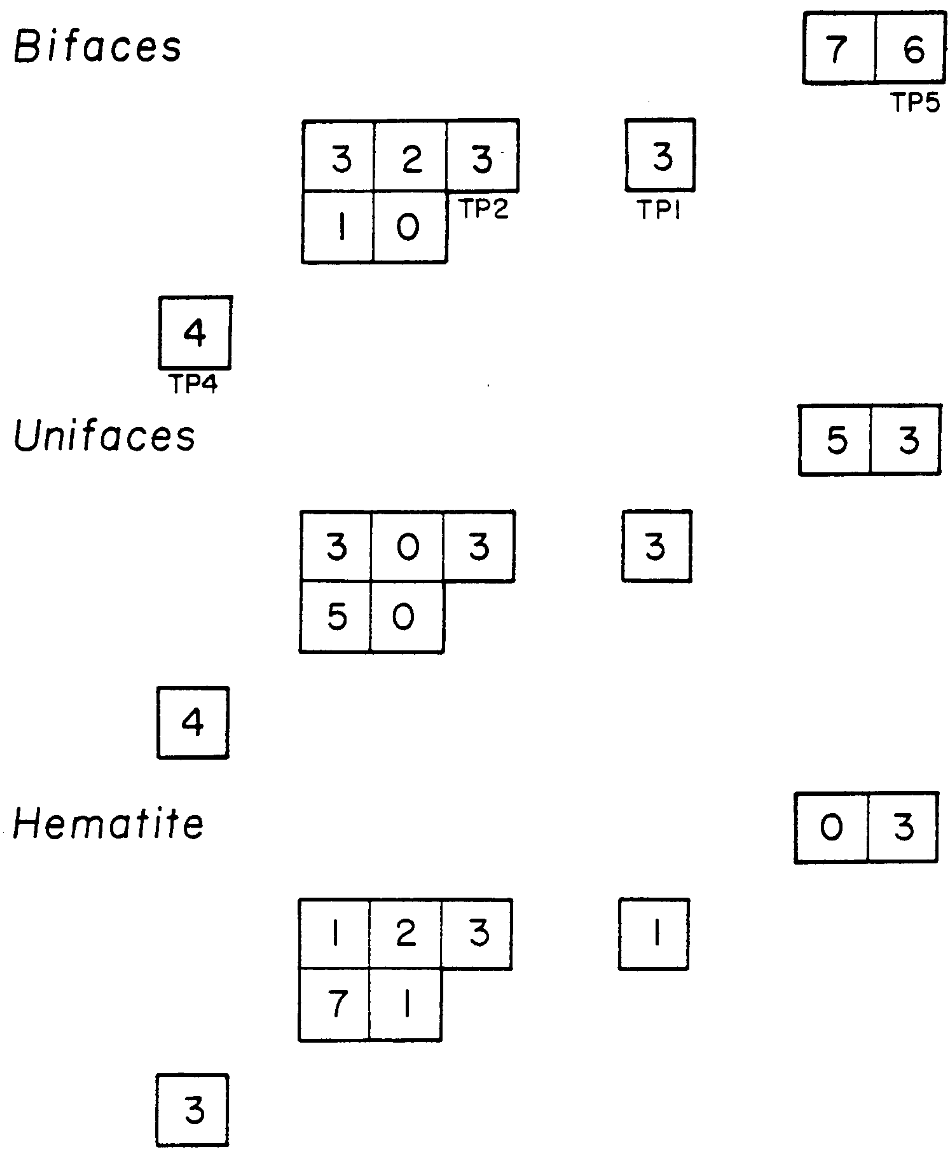


Figure 3.9. Horizontal distribution of tools in the upper component of 23BE660.

at this different loci. Any attempt to infer different occupation intensity or activity loci may therefore be invalidated by differing preservation factors.

The horizontal structure of the deposits in the upper component at 23BE660, as that structure is understood from a limited exposure, is one of a rather homogeneous scatter of debris along the terrace edge. Differential densities may be the result of geomorphic disturbance as much as of cultural activity.

Intra-Site Distributions
Lower Component

Only two squares, Test Pit 4 and 100N 532W, were excavated to sufficient depth to encounter the lower cultural horizon. In Test Pit 4, debris was first encountered in the 110-120 cm BPZ level and continued to the bottom of the excavation at 150 cm BPZ. Peak debris density was recorded in the 130-140 level. This peak, however, was a modest ten pieces of debitage. In square 100N 532W, the lower horizon was first encountered in the 140-150 cm BPZ level and continued to the bottom of the excavation at 200 cm BPZ. Peak density was the seven flakes from the 160-170 cm BPZ level. No tools were found in this horizon in any level in either square, and none of the flakes or flake fragments were noted to have been modified.

The thickness of the cultural deposit (40 cm in Test Pit 4, 60 cm in 100N 532W) and the nature of the vertical distribution suggest that debris from this original occupation level has also been moved through the profile. Size grade data on the few flake fragments are hardly meaningful but it may be notable that three large flakes (size classes 4 and 6) were recovered in Test Pit 4 and all are either in or above the 130-140 cm BPZ level. The three flakes in size classes 4 to 6 in 100N 532W are also all above the 160-170 peak density level. In fact, all items below this level are shatter.

Summary and Conclusions

The test excavations at 23BE660 have shown that the site is a multicomponent stratified site. The earliest occupation is undoubtedly Archaic but cannot be assigned any more specifically. This component is represented solely by a sparse quantity of debitage and was encountered in only two squares that were excavated for depth.

The second occupation, and the one that is most intense, is assigned to the Late Archaic period. The context of the assemblage suggests the main occupation level is below the base of the plowzone and that artifacts have been moved through the profile subsequent to deposition. The assemblage associated with this component includes projectile points, a variety of bifaces, a diversity of scrapers, and a large quantity of hematite. It also includes a quantity of debitage that largely represents the latter stages in the reduction process.

The large quantity of hematite associated with this component is notable. Only two sites excavated in the Truman Reservoir have yeilded a greater quantity of hematite. One is Rodgers Shelter (Kay et al. 1978); the other is 23BE337 (Roper and Van Ness, Vol. II, Pt. III). At the latter, an excavation considerably larger and surface collection far more extensive than that at 23BE660 yielded only four more pieces than did 23BE660 and had a lower ratio of worked to unworked pieces. While it would be immoderate to say that 23BE660 was a hematite processing station, the conclusion that hematite processing was an important activity would seem entirely warranted.

A final, very minor occupation or occupations occurred during the Late Woodland period. This occupation is known entirely from one sherd and one projectile point in excavated context and additional projectile points in the original surface collection.

Any recommendations for further investigations at this site are obviated by the rain-induced flooding of the site even prior to completion of the 1977 testing and the subsequent inundation by pre-impoundment and later impoundment of the waters of the Truman Reservoir. With the site at an elevation of 660' AMSL, Truman Reservoir would have to be almost totally drained before the site would once again be exposed. The depth of the major cultural deposits, however, plus the depth of the site in the reservoir would combine to perhaps lessen the rate of destruction of the site. If the site were ever again exposed, additional investigations might be repaid by additional information on Late Archaic habitation in the South Grand River Valley.

References Cited

Benedict, James B.
1978 Excavations at the Hungry Whistler Site. In The Mount Albion Complex, by James B. Benedict and Byron L. Olson, pp. 1-75. Center for Mountain Archeology Research Report 1. Ward, CO.

Chapman, Carl H.
1975 The archaeology of Missouri, I. University of Missouri Press, Columbia.

Duffield, Lathal F.
1970 Vertisols and their implications for archeological research. American Anthropologist 72(5): 1055-1062.

Kay, Marvin, et al.
1978 Rodgers Shelter techno-functional studies. In Holocene adaptations within the lower Pomme de Terre River valley, Missouri, edited by Marvin Kay, Ch. 7. Report to the U. S. Army Corps of Engineers, Kansas City District. Illinois State Museum Society.

Roper, Donna C.
1977 Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. IV: the archeological survey. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Roper, Donna C. and Michael R. Piontkowski
1979 Projectile points. Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. V: lithic and ceramic studies. Report to the U. S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri-Columbia.

Stockton, Eugene D.
1973 Shaw's Creek Shelter: human displacement of artifacts and its significance. Mankind 9: 112-117.

Wood, W. Raymond and Donald L. Johnson
1978 A survey of disturbance processes in archaeological site formation. In Advances in archaeological method and theory, Vol. 1, edited by Michael B. Schiffer, pp. 315-381. Academic Press, New York.

CHAPTER 4

THE COOTIE SITE – 23BE676

by

Susan K. Goldberg

Location and Environmental Setting

The Cootie Site is located in the Tom Township in Benton County. At an elevation of 660' MSL it is situated on a T-1b terrace on the right bank of the South Grand River and is approximately 500 feet to the west of the Long Shoal Bridge. Immediately adjacent to the site is a backwater lake which was probably formed as the result of a changing stream regime and a shift in the meander pattern of the South Grand River. The site is also only 175' from the base of a bluff, thereby being situated in a very narrow portion of the valley. On the north side of the river, however, the floodplain is expansive (Fig. 4.1).

At the time of the initial location of 23BE676 and subsequent investigations, the site was wooded with nearly 100% ground cover of grasses, weeds and shrubs. It was this thick vegetation and associated invertebrate microfauna which suggested the name "Cootie" for the site. It was apparent from the age of the trees at the site that the native vegetation had been disturbed at some time in the past. The area had evidently been cleared either for agriculture or grazing. The extent of disturbance below the surface was never determined; no plowzone was evident.

A chert study was performed in the area (Ray, Vol. II) with mapping of all outcrops and stream deposits within a 1 km radius of the site (Fig. 4.2). From this study it was determined that if cherts were selected in proportion to their availability, the inhabitants would have used Jefferson City, Chouteau and Burlington cherts in the percentage of 75, 10 and 15, respectively.

Soils in the general area are classified with the Hartville-Ashton-Cedargap-Nolin association (Allgood and Persinger 1979).

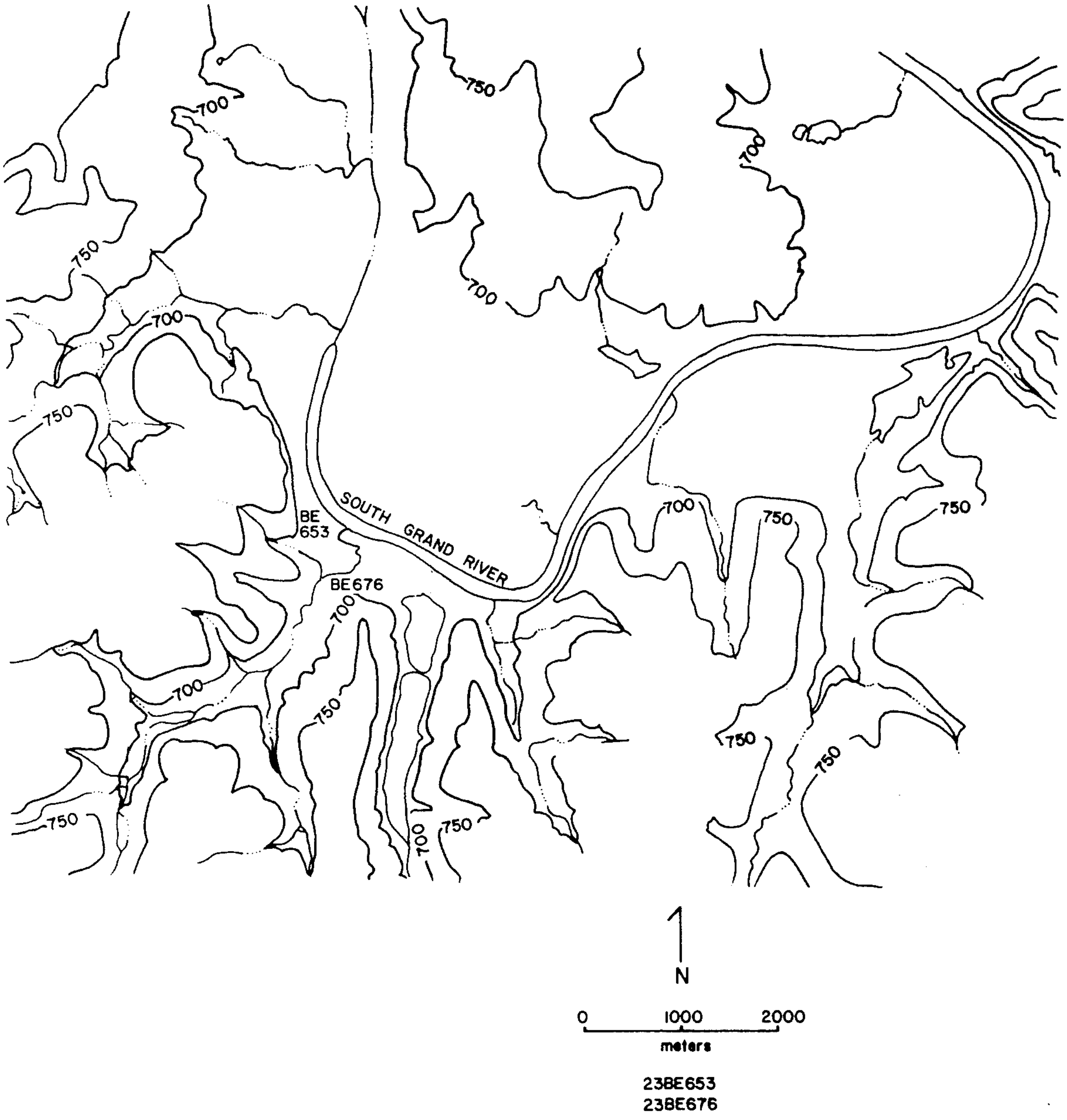


Figure 4.1. General location of the Cootie (23BE676) and Cootie West (23BE653) sites.

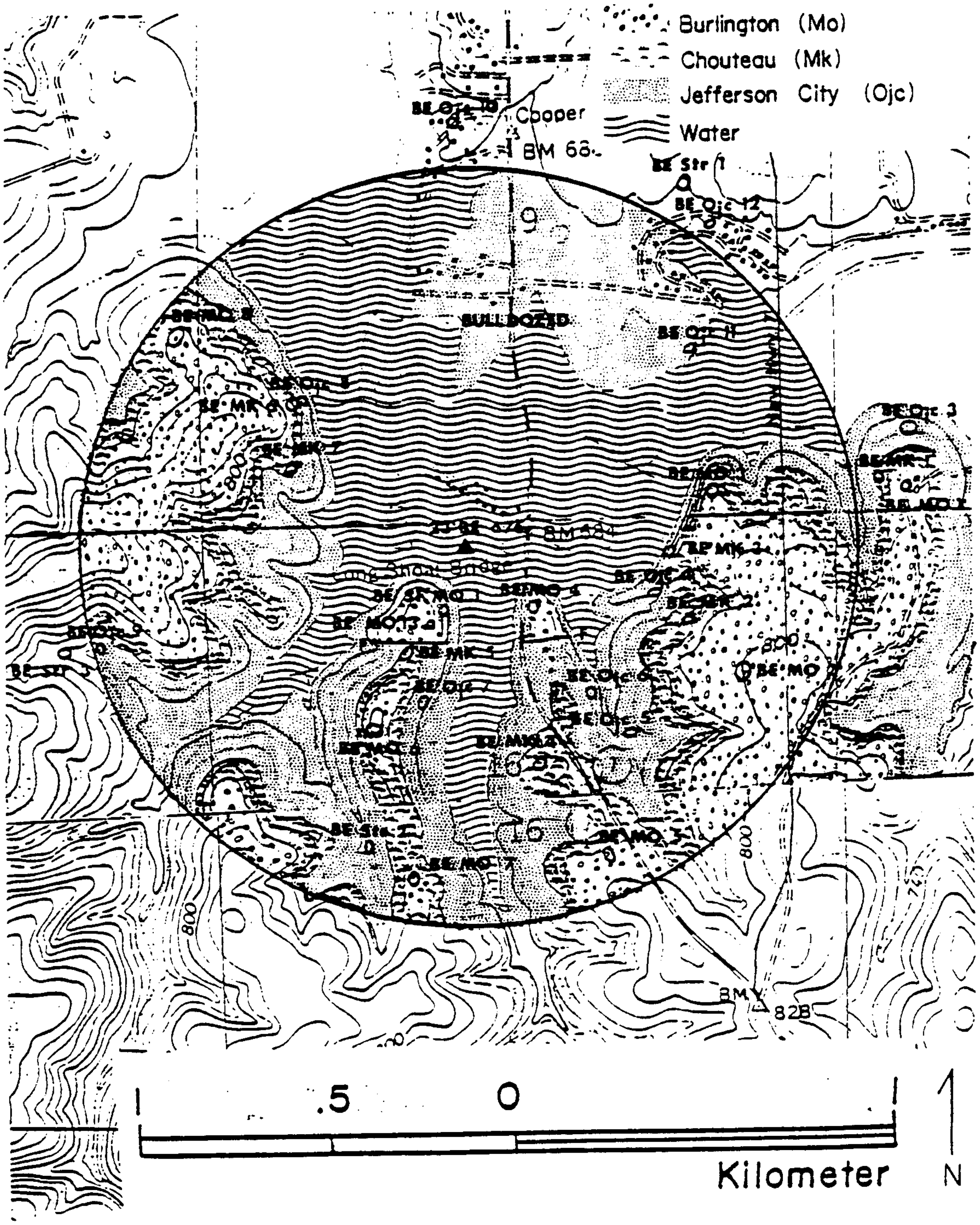


Figure 4.2. Map of chert availability surrounding 23BE676.

Background

The discovery of 23BE676 was somewhat inadvertant. It was not located until May of 1977 after the Stage 2 transect survey had been completed. During the first month of the mitigation program, a number of sites were selected for revisitation. Twenty-five percent of the sites during the initial survey containing no evidence for temporal assignment were resurveyed (see this vol., Pt. I, Chapter 3). One of these sites was 23BE653, only .3 kilometers to the west of the Cootie Site, 23BE676 (Fig. 4.1). In the surveyor's attempts to relocate the buried deposits of 23BE653, shovel testing was done along the terrace. At that time cultural material was found in a new location. Initially, it was suggested that these new cultural deposits were merely part of 23BE653. Subsequent shovel testing, however, confirmed that the debris scatter was discontinuous and that the two sites were quite separate even though they were on the same terrace. The new site was designated 23BE676.

Shovel-testing in both 23BE653 and 23BE676 revealed extremely high densities of lithic material in the middens. Particularly at 23BE676, the frequency of well-made tools, including bifaces, scrapers, and groundstone, was also high. Additionally, neither site had readily apparent plow disturbance and both contained fairly well preserved charcoal; the potential for site integrity and observation of site structure was good. In spite of the fact that neither site was temporally assignable (a single unidentifiable straight stemmed projectile was collected from 23BE653 and no points were collected from 23BE676), their apparent integrity – so rare in open sites in the study area – made them logical choices for further testing. Given the high artifact densities, it was likely that diagnostics would be recovered. With temporal control, site integrity and large assemblages these two sites could yield valuable chronological information which would be applicable to the many surface assemblages in the area.

Initial Testing

At the time of the location of 23BE676, a series of shovel tests were excavated to determine the site's parameters. These twenty-four tests were in a grid with approximately five to ten meters between holes (Fig. 4.3). While nearly all shovel tests contained some cultural debris, the holes in Line 6 contained very little. The major artifact concentration from the site appeared to be centered around Hole 3 in Line 4 (Fig. 4.3). Material from these initial tests was not collected but was returned to the hole from which it was excavated to facilitate decisions about the location of test units for the following phase.

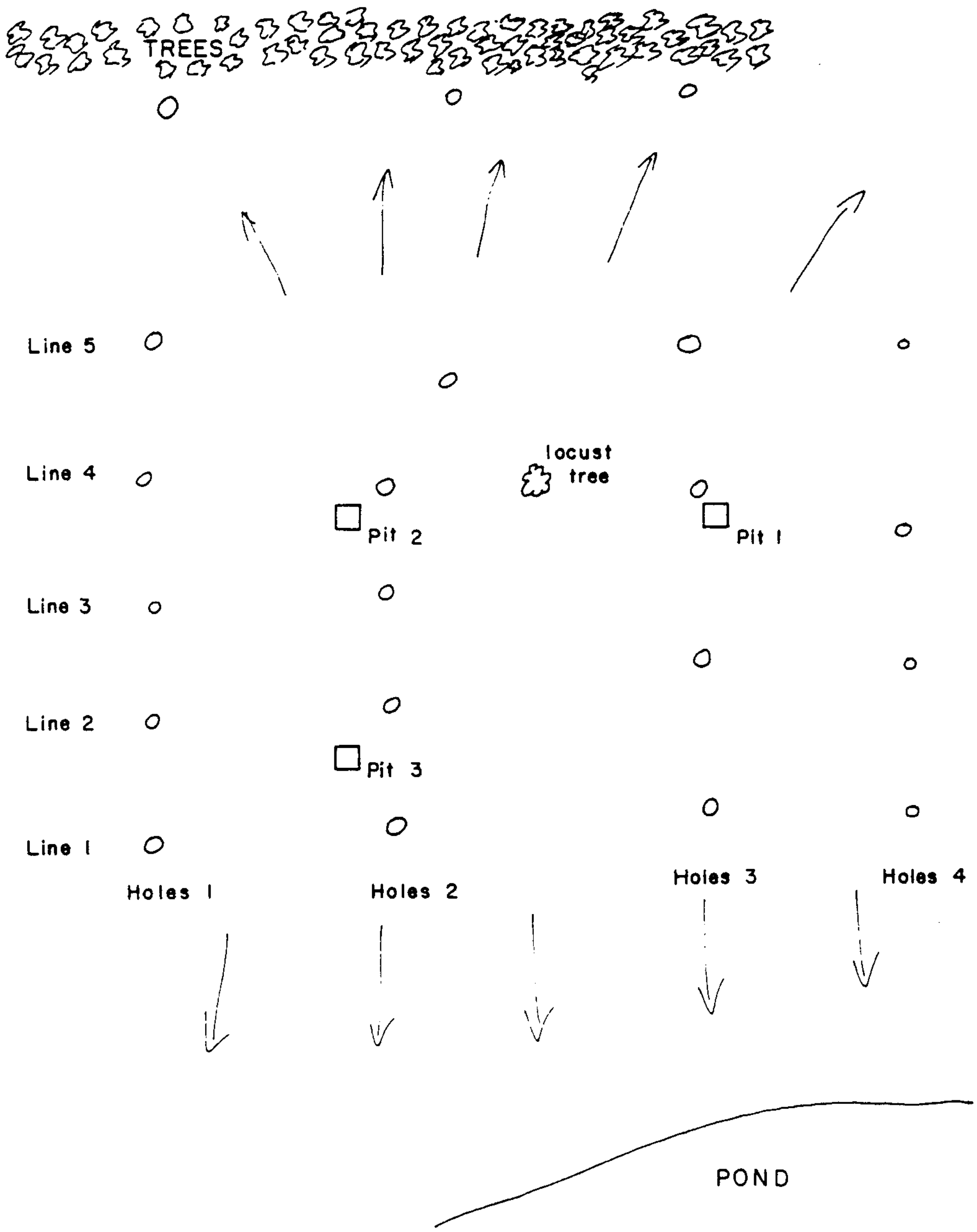


Figure 4.3. Location of shovel tests at 23BE676.

The testing phase consisted of excavating three 1 x 1 meter units in the area which appeared to have the heaviest concentration of debitage. A site datum was established and units were laid out with compass and tape at 0S/5W, 0S/20W, and 10S/20W – Pits 1, 2 and 3 respectively (Figs. 4.3 and 4.4). Pits 1 and 2 were on the crest of the terrace, with Pit 1 cross-cutting the locus of the highest tool frequency as determined by shovel testing. Pit 3 was farther south on the slope of the terrace and closer to the backwater lake.

Excavation in these three test pits proceeded in arbitrary 10 cm levels starting from the surface, since no plowzone was apparent. All dirt was removed with shovels and trowels and passed through a 1/4" mesh screen and all materials were collected. Excavation in Pit 1 continued to 60 cm and in Pit 2 to 70 cm. Debris density in these squares had decreased considerably by this depth but not completely. Shoveling in a 1 x 1 m unit at this depth was difficult, so excavation was discontinued until a decision was made about more extensive investigations at the site. Pit 3 was excavated to a depth of 80 cm. While it, too, was difficult to shovel at this depth, the occurrence of pottery in the 60 to 70 cm level made it necessary to continue. The presence of pottery in open sites in southwest Missouri is unusual, particularly throughout such a deep midden deposit. If it were found that ceramics were in an undisturbed context at such a great depth, it would mean that the Woodland cultural deposits at 23BE676 were quite thick. Such would be an ideal situation for physical separation of temporally distinct cultural assemblages, allowing study of change through time and development of cultural chronologies. As it happened, cultural material in Pit 3 disappeared by the base of the 70 to 80 cm level; no additional pottery was found, and excavation was discontinued.

Preliminary analysis of the materials recovered during this testing phase and of the structure of the site led to the conclusion that further investigation at the Cootie Site would be productive. The selection of 23BE676 for extensive excavation was dictated by several factors which made it more desirable than many of the other sites which had been resurveyed and shovel tested. First, the Cootie Site appeared to have the highest density of well made tools below the surface and probably in a fairly undisturbed context. Many other sites contained high frequencies of artifacts, but most were on the surface or in the plowzone. At 23BE676 from just three test units, a total of forty-six chipped stone tools and thirteen pottery sherds were recovered. These tools were found throughout the deposit – not in just the upper levels. It appeared that, because of the depth of the cultural deposit, temporally distinct assemblages could be physically isolated.

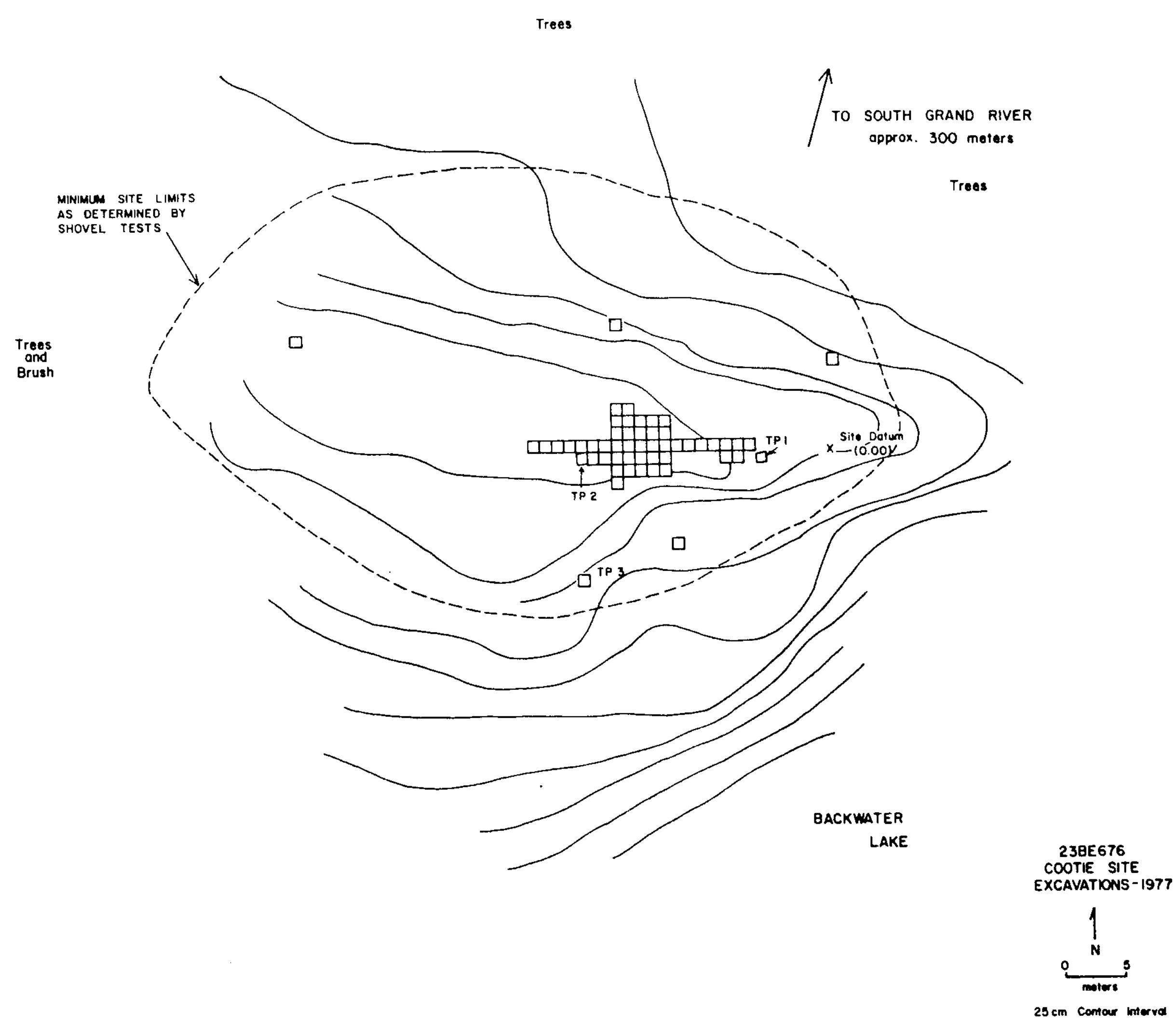


Figure 4.4. Site map of 23BE676, showing area of scatter and location of excavation units.

Second, not only were tools occurring in high frequency, but there was great variability in their morphology; several formal, and presumably functional, types were represented (Table E-4.1). Several forms of bifaces, projectile points, and unifacial scrapers were recovered as well as some forms which appear less frequently in southwest Missouri (e.g., blades and bifacially worked scrapers). A high diversity of tools, particularly from an excavated context, would provide a better understanding of assemblage variability at other sites in the study area.

The degree of preservation at 23BE676 was a third factor in its selection for intensive excavation. This preservation took three forms. First, the botanical remains appeared well preserved. This would allow identification of plant species being utilized and would facilitate paleoenvironmental reconstruction. No faunal remains were recovered during the testing phase, but the presence of botanics at the site suggested that bone would be similarly preserved. Second, there were ceramics at the Cootie Site. Those recovered during testing were small and friable, but in a region where a ceramic chronology has not been refined and the data to do so are infrequently recovered, this site showed some potential. The third form of preservation found at 23BE676 was site integrity and the appearance of cultural features. The deposits seemed to be disturbed only by roots and rodents rather than by wholesale destruction by plowing or other types of earth-moving. Many of the sites in the area appear to be comprised of undifferentiated midden; there is little evidence of prehistoric activity in the matrix in the form of features such as pits, postmolds, or housefloors. During the initial testing at 23BE676, several anomalous areas containing darker soil and higher concentrations of charcoal appeared in the matrix. Although the patterning of these was unstructured, their presence indicated that natural leaching, earth movement, and other processes which destroy visible site structure may have been minimal. Features and structures at a site would increase the data yield and enable analysis of intrasite activity and functional assemblage definition.

A fourth factor leading to the selection of 23BE676 for excavation was the apparent time depth represented there. In Pit 1 there were projectile points indicative of both the Woodland (Category 322-Scallorn) and the Late Archaic (Category 326-Smith and Category 336-a straight stemmed form) periods. The soil sediments at the site also suggested that a span of at least 1000 years may be represented. Two sediments are found in each of the test pits (Figs. 4.5 and 4.6). The earliest of these appears to be Rodgers alluvium, a yellow brown (10YR4/3) sandy clay with a blocky structure and grey clay skins. The cultural material deposited in this during the original alluviation probably is older than

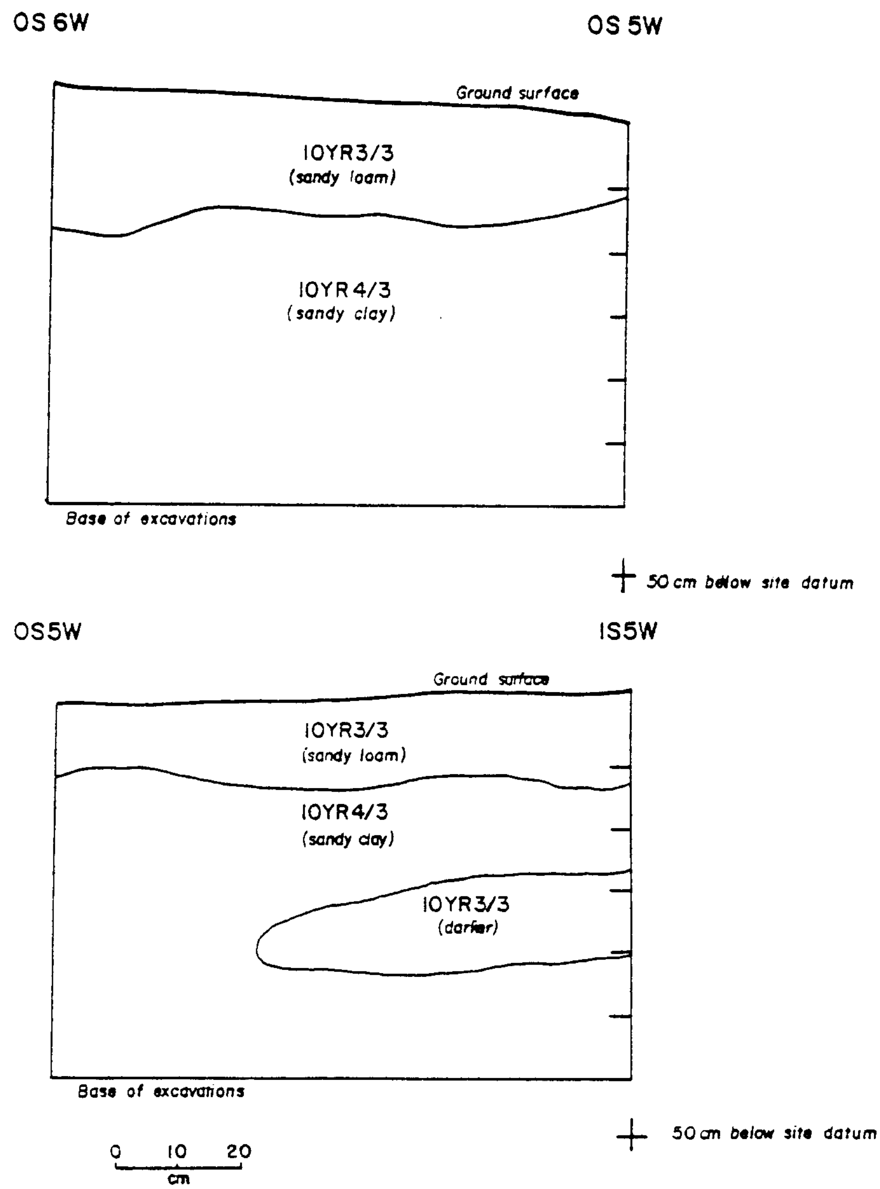


Figure 4.5. Profiles of Test Pit 1 at 23BE676.

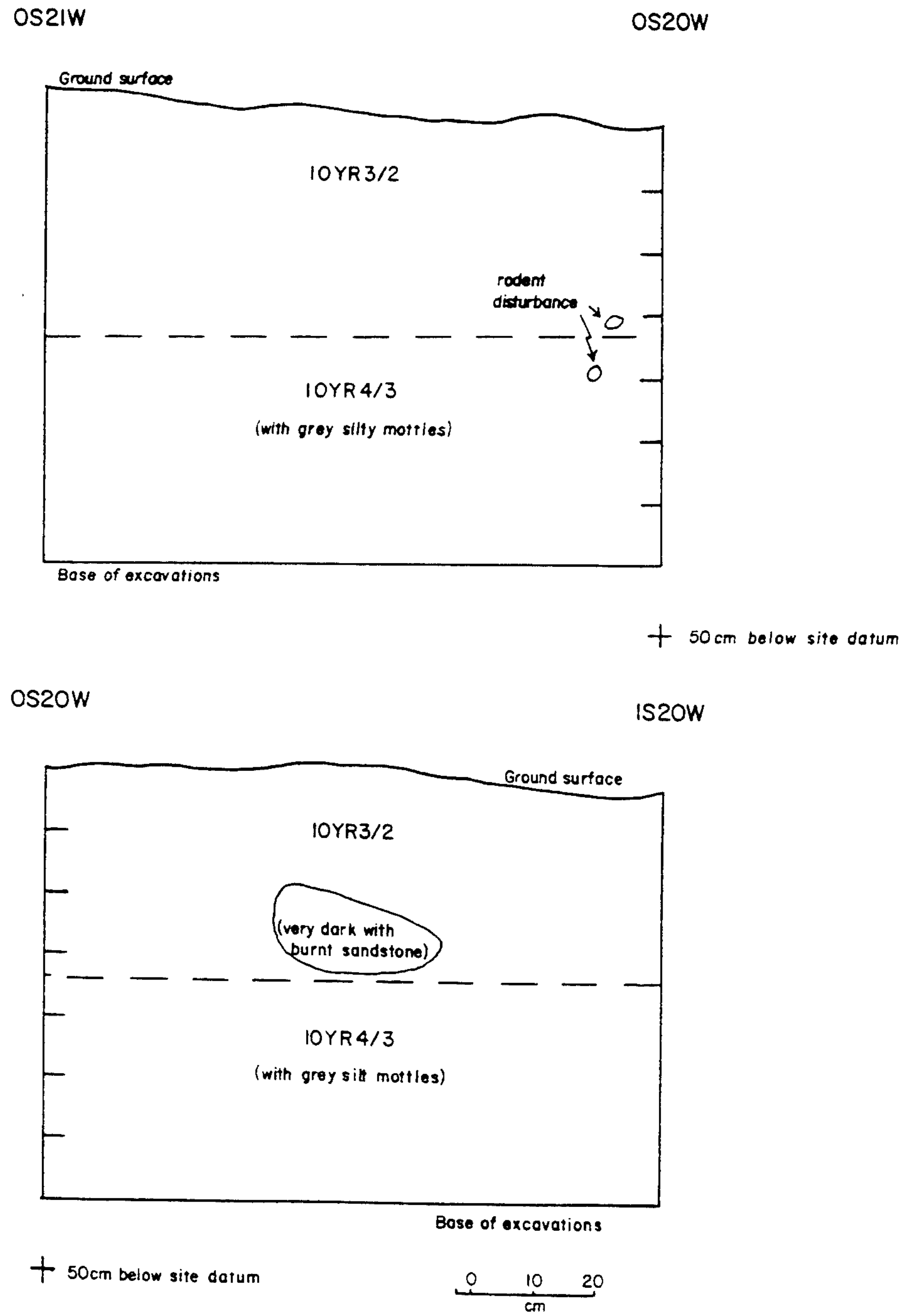


Figure 4.6. Profiles of Test Pit 2 at 23BE676.

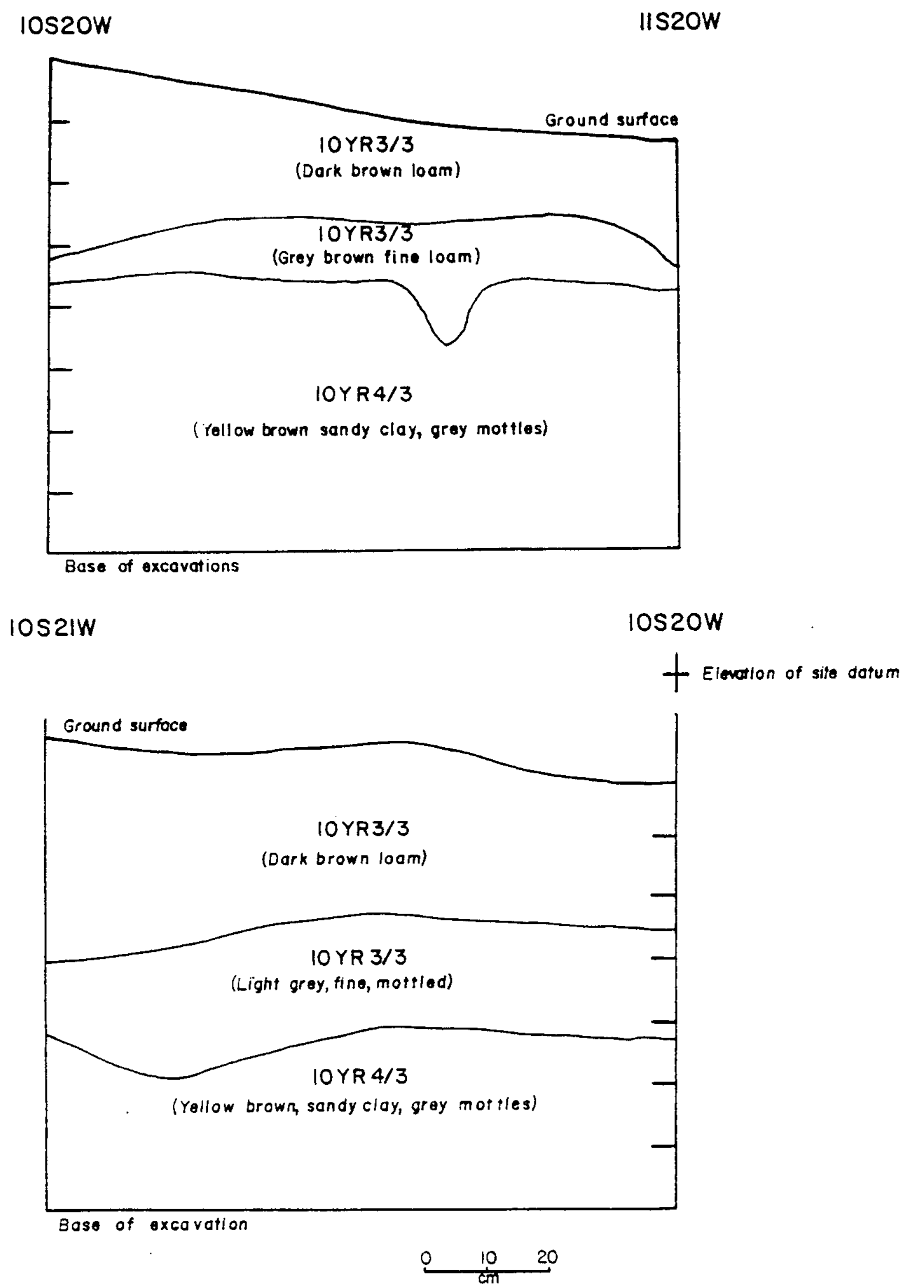


Figure 4.7. Profiles of Test Pit 3 at 23BE676.

1000 B.P. Overlying the Rodgers alluvium is a dark brown to greyish brown (10YR3/3 and 3/2) sediment which is a fine-grained and loamy overbank deposit of the modern floodplain Pippins alluvium. Materials in this deposit probably post-date 1000 B.P.

The final consideration in the selection of 23BE676 for full-scale excavation was its elevation. At 660' MSL, the Cootie Site would be inundated during pre-impoundment and remain under the reservoir waters indefinitely. Immediate mitigative action was necessary for retrieval of information from this potentially valuable site.

Excavation

In the middle of July 1977 after the shovel testing program was completed, it was decided that excavation at 23BE676 should proceed. It was one of four sites chosen for more extensive investigation and would be one of the first to be inundated.

Based on information obtained during testing, a T-shaped trench was laid out. Running east-west from 1N/17W to 1N/24W and north-south from 4N/17W to 25/17W (coordinates represent the northeast corner of 1 x 1 meter units), this trench dissected the terrace slope and also the terrace crest (Figs. 4.4 and 4.8). Such a strategy was employed to ensure exposure of the cultural deposits in relation to their topographic position to determine if differential deposition occurred as a result of terrace formation processes. While occupation may have been most intense on the highest part of the site (i.e., terrace crest), processes of sedimentation may have resulted in deeper and stratigraphically separated deposits on the terrace slope within the Pippins alluvium. Placement of the east-west segment of the trench was determined by debris distributions as determined from testing. Artifact density was highest along the terrace crest in Pit 1 and Pit 2. Although this density was highest in the east (Pit 1), the highest density there occurred near the top of the deposits (Table E-4.1). It was thought that such a high concentration may have been caused by soil deflation and not necessarily by relatively intense prehistoric activity in that area. Many years of debris accumulation may have been collapsed into a few centimeters of deposit if soil deposition in that area had been slow or if soil had eroded from the area. For that reason and because the debris (e.g., flakes, shatter, etc.) density in Pit 2 was higher than in Pit 1 (Table E-4.2), the trench was placed in the western portion of the site.

As excavation proceeded in these fourteen units, it became apparent that if structural features — of which some traces had been seen — were to be revealed, a larger area

would have to be exposed. Therefore, additional 1 x 1 meter squares were extended from the original T-trench. These units were placed in areas where features had been found, creating a large western excavation block, consisting of the original fourteen squares, Pit 2, and twenty-five additional units (Fig. 4.8).

An eastern block consisting of five 1 x 1 meter units was also excavated (Fig. 4.8). This area was opened to complete the east-west exposure of the midden. This allowed investigation of differential soil sedimentation and movement in the eastern area where it looked as if deflation contributed to the archeological formation processes.

In order to define the parameters of outlying portions of the site, four other 1 x 1 meter units were placed north, west, south and northeast of the major excavation blocks. These enabled determination of the extent and density of the site. To determine the site's perimeter, sixteen shovel test probes (approximately 40 cm^3) were excavated, extending outward from the block excavations until cultural material had disappeared. The minimal site limits (Fig. 4.4) were determined by these shovel tests.

TECHNIQUES

Each 1 x 1 meter unit was excavated by means of shovel scraping and troweling with all dirt sifted through a 1/4" mesh screen. Artifacts found in situ were plotted and all other materials from the screen were collected in general level bags. Excavation proceeded in arbitrary 10 cm levels with measurements taken from the ground surface at the northeast corner of each unit. Previous attempts to discern a plowzone were unsuccessful, so arbitrary levels were used, starting from the top of the deposits.

During the excavations, several areas of soil with anomalous coloration, texture or debris concentrations were noted. These features, presumed to be traces of cultural activity, were pedestaled, cross-sectioned, and profiled. The matrix from one-half of each feature was retained for flotation processing. Two soil samples were removed from each feature area – one from the feature fill and one from the surrounding matrix. These samples were collected for subsequent phosphate and pollen analyses. The second half of each feature was processed in a manner similar to the other excavation units; they were trowelled and screened through a 1/4" mesh.

Samples of all macrocarbon and fauna were taken from all excavation units. While few of the carbon samples were of suitable size for use in radiometric dating, they were of sufficient size for species identification. Faunal remains were extremely sparse and were generally poorly preserved but were collected nonetheless.

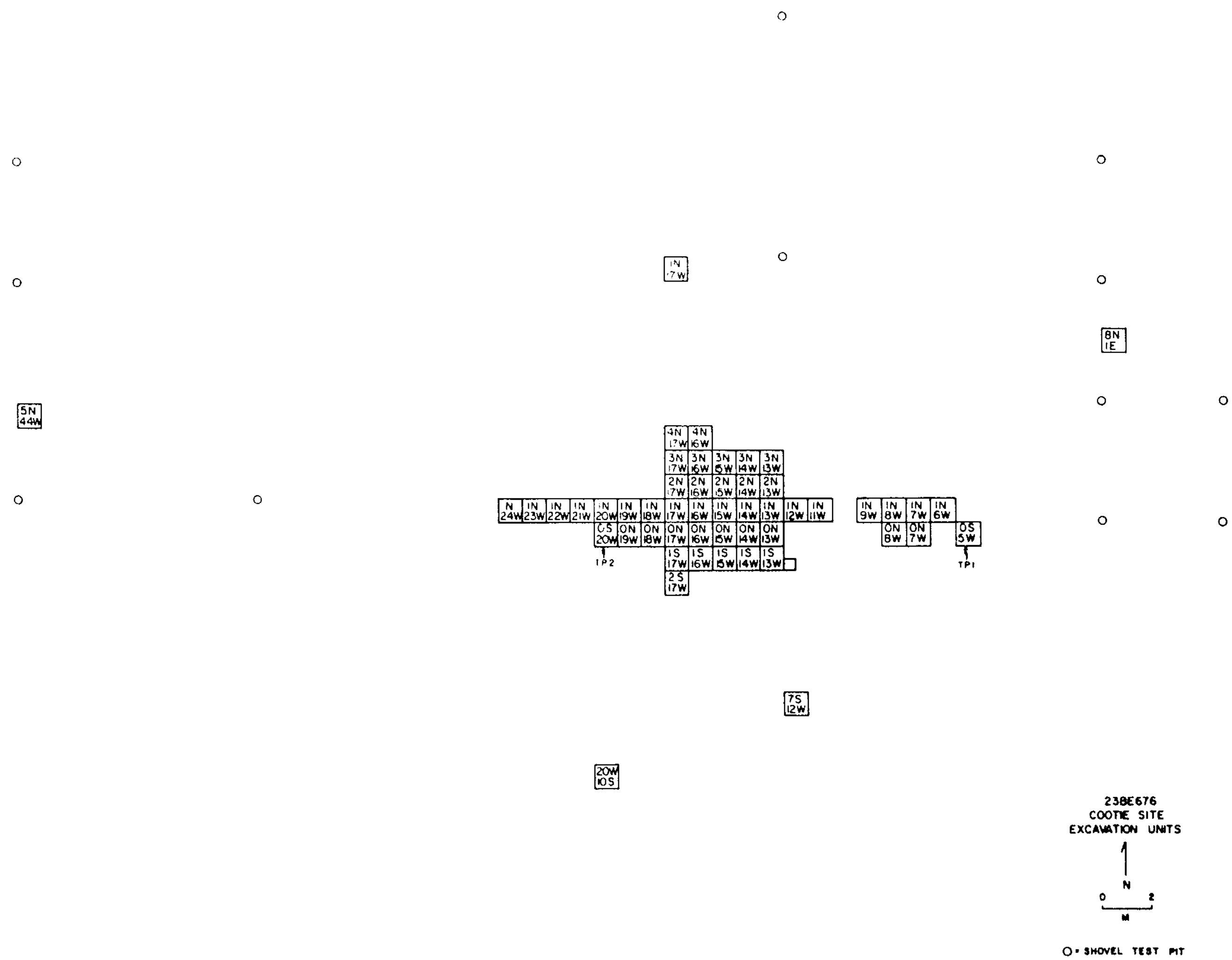


Figure 4.8. Plan of excavation units at the Cootie Site.

Excavation was terminated throughout the units at varying depths; one unit stopped at 20 cm, four at 30 cm, thirteen at 40 cm, seventeen at 50 cm, eight at 60 cm, five at 70 cm, and one each at 80 cm and 160 cm. In only two of the shallowest units had cultural material completely disappeared by the bottom of these excavations. Since one of the major purposes of intensive excavations at 23BE676 was to achieve a large areal exposure of the Woodland component to ascertain site structure, the early emphasis was on opening a quantity of contiguous units. In each of the units, as debris density decreased significantly and features were no longer visible, excavation was temporarily terminated. Most often this was at a depth of between 40 cm and 60 cm. Only after several weeks of excavation was an area of the site found which contained buried cultural material. In this area, near the center of the site, a test unit was excavated to determine the depth of completely sterile soil. Until this unit was excavated, it was thought that small quantities of lithic material occurred below the midden but had been transported to this depth through various processes of pedoturbation. In that unit, 2N/13W, however, debris was found to a depth of 140 cm below ground surface. Two additional levels, to a depth of 160 cm, were excavated to assure that the bottom of the cultural deposits had been reached. While debris frequency in the lower levels in that square never reached the quantity found in the upper midden (0-50 cm), debris scatter was fairly continuous for an additional 90 cm. Moreover, a Smith dart point (Category 326) was found in the 130-140 cm level. It became clear that in at least this part of the site an earlier cultural component was represented in the deeper sediments.

Unfortunately, the realization that there was potential for underlying earlier deposits came too late for further testing. Just one month after excavations had begun at 23BE676, an excess of rain, combined with pre-impoundment of reservoir waters, made the site totally inaccessible. Excavation had to be discontinued on August 18, 1977 although only one unit had been dug into the lowest component.

Profiles were drawn for each 1 x 1 meter unit. Where continuous walls were available (e.g., the walls of trenches and sides of large excavation blocks), these were chosen for profiling. In small discontinuous units, walls which provided the most information about stratigraphy and features were drawn. As stated previously, profiles were made of each possible feature.

Stratigraphy

The stratigraphy at 23BE676 is quite variable in different areas. This intra-site variability can be explained by both natural and cultural factors. Processes of terrace

formation probably account for differences that seem to correlate with the natural topographic features at the site. Two types of alluvium are represented in the site area and are identifiable on the basis of color, texture, and inclusions. The more recent of the two is Pippins Alluvium which tends to be dark brown, fine grained, silty loam. The earlier Rodgers Alluvium is a more yellowish or reddish brown with larger sand and clay components and with grey mottling and clay skins. The terrace on which the Cootie Site is located is a T-1b, composed of Rodgers alluvium. More recent Pippins alluvium has been deposited primarily at the base of the terrace, but shallow Pippins overbank deposits appear to cover the Rodgers sediments.

The variability in depth of the Pippins alluvium can be seen in the profiles of the excavation units. Along the east-west axis of the site (in the west where the excavations follow the terrace crest (Fig. 4.9, 1N/25W to 1N/8W), the Pippins (10YR3/2) is from 20 to 30 cm thick. A similar profile is seen slightly farther north and east on the terrace crest (Fig. 4.9, 3N/16W to 3N/13W). To the east of this, where the terrace begins to slope downward (Fig. 4.10, 1N/10W to 1N/6W) the Pippins has been almost totally deflated and Rodgers alluvium (10YR5/4, 10YR4/6, 10YR4/4) lies near the surface.

Along the north-south axis of the site a similar profile, following the topography is seen. At the 13W line (Fig. 4.11) a distinct horizon of Rodgers alluvium can be seen in unit 2N/13W at 50 cm below surface. Between 20 cm and 50 cm below surface is a stratum which is heavily mixed consisting of sediments typical of both Pippins and Rodgers alluvium. Near the south end of this profile, in units on the slope of the terrace, the Pippins is shallow and Rodgers is closer to the surface. The same trend is seen in the profile along the 18W line (Fig. 4.12), although there is almost no mixing of the two sediments in this part of the site.

Another set of profiles (Fig. 4.13) from unit 7S/12W, also on the terrace slope, shows the distinction between the Pippins and Rodgers alluvia. In this area of the site, the Rodgers sediment takes on its more normal reddish brown color (5YR3/2).

The only unit which was placed very near the base of the terrace (10S/20W) demonstrates the differential deposition of Pippins in relation to a T-1b terrace. In this unit (Fig. 4.7) the more recent Pippins alluvium is nearly 55 cm thick.

The effect of cultural activity on the deposits at Cootie Site are most clearly seen in terms of lithic debris densities which will be presented in a later section.

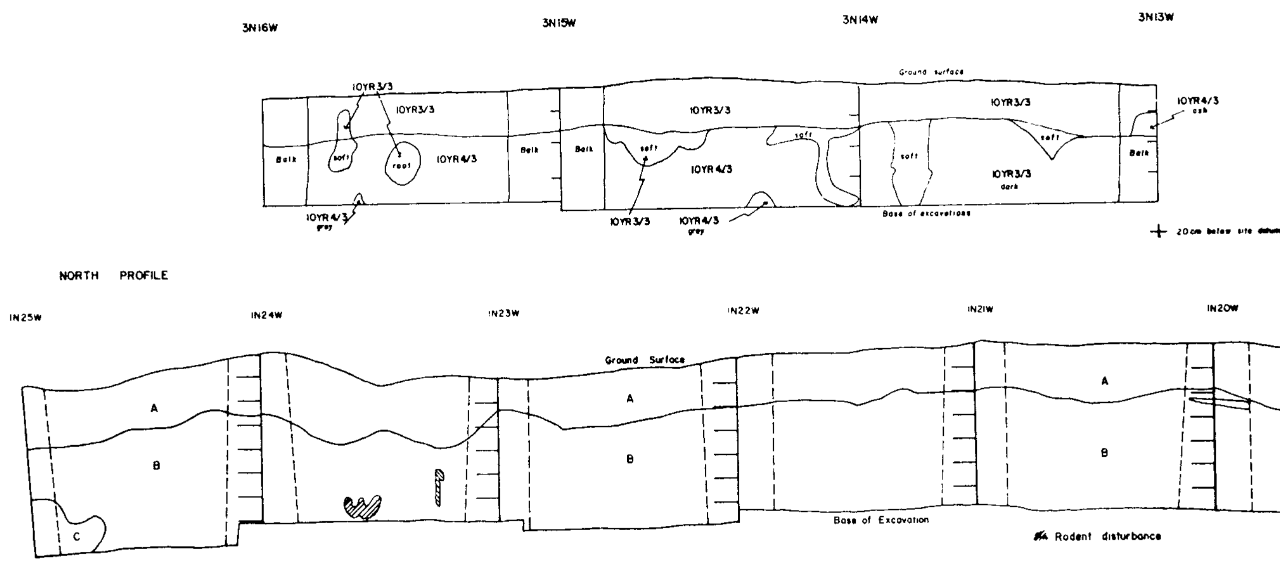


Figure 4.9. North wall profile of the western portion of the excavation block.

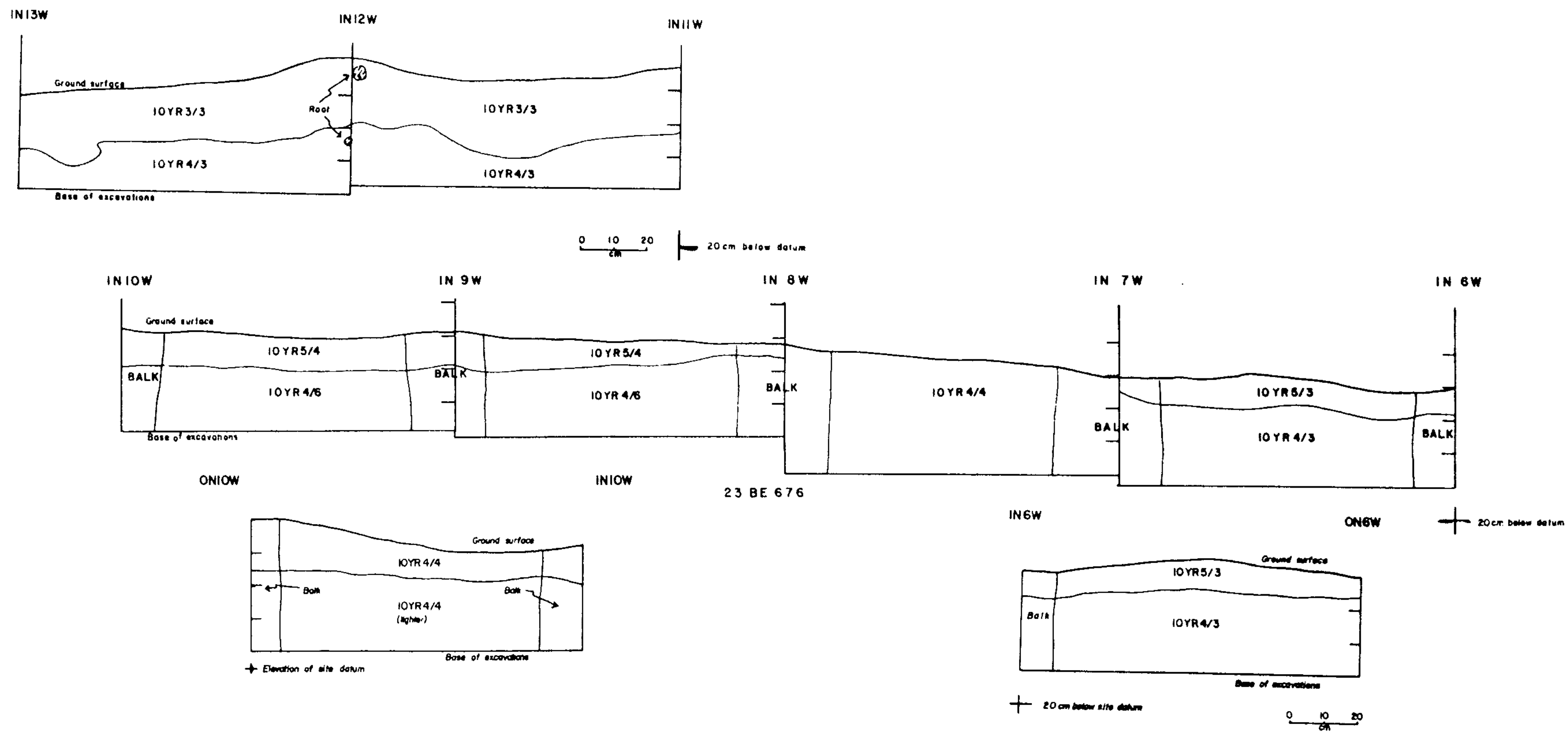


Figure 4.10. North wall profile of the eastern portion of the excavation block.

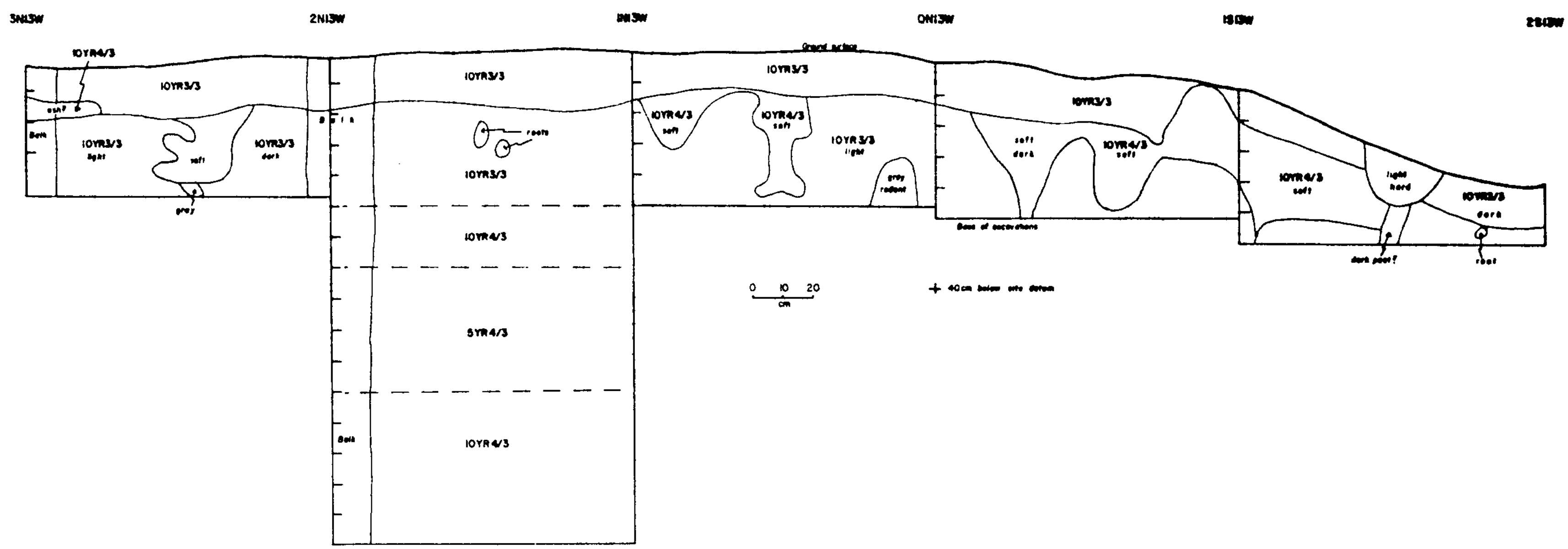


Figure 4.11. East wall profile along the 13W line.

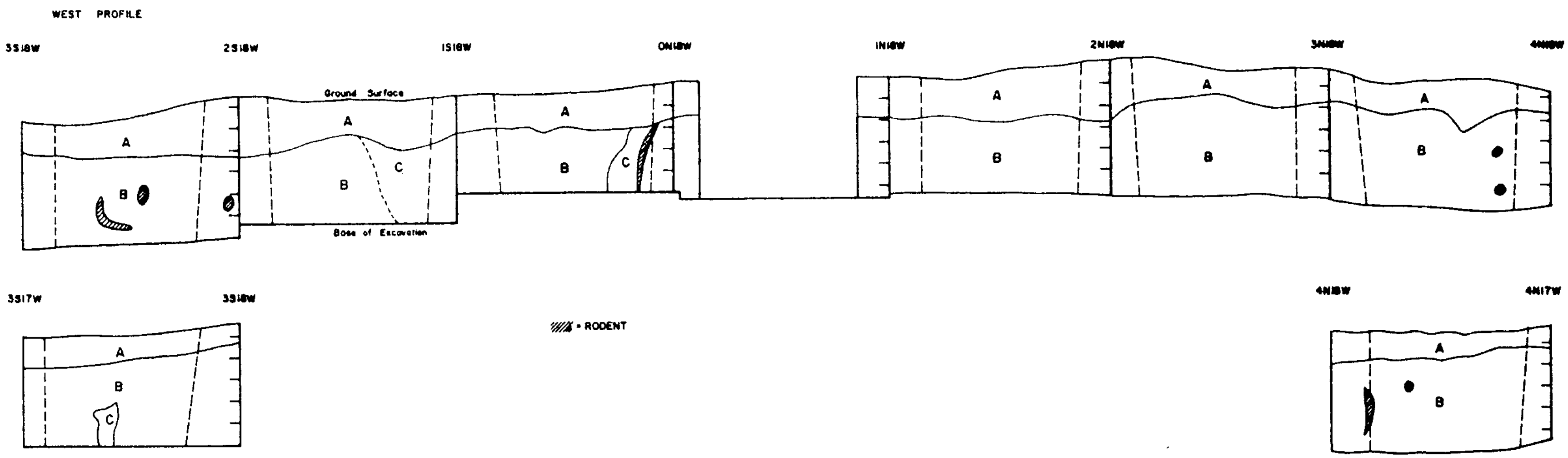


Figure 4.12. West wall profile along the 18W line.

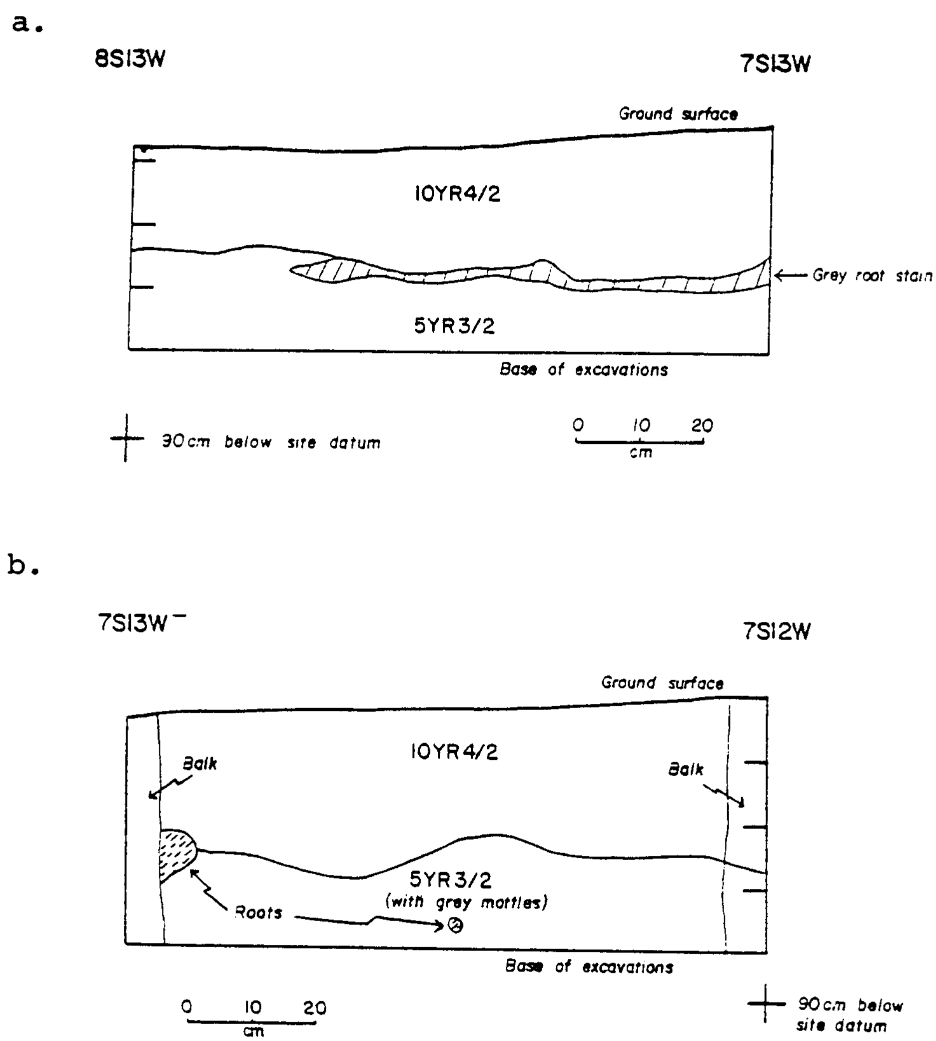


Figure 4.13. West (a) and north (b) profiles of unit 7S/12W.

However, soil color variability across the site also appears to represent differences in site use and midden accumulation. On the crest of the terrace (Fig. 4.9, 1N/25W to 1N/18W) where tool density is extremely high the soil is darker and greyer than elsewhere on the site. This may be the result of intensive food preparation and hearth activity. The soil is also dark greyish brown in 7S/12W (Fig. 4.13). Intensive cultural activity in the upper component of the site may also have resulted in the mixing of sediments noted along the north-south axis of the site (Fig. 4.11).

Features

During the excavations there were fifteen areas which were designated features. These consisted of either concentrations of tools and debris or, more frequently, were areas of soil which were darker than the surrounding matrix. Each possible feature was cross-sectioned to determine its shape and structure in profile. Such a procedure allowed the determination that at least two which were originally thought to be post molds were actually rodent runs. The remaining thirteen were probably the result of prehistoric activity at the site. A brief description of each follows as does a plan (Fig. 4.14).

Feature 1: This dark soil stain included small charcoal mottles and oxidized soil flecks. The presence of roots and the diffuse nature of the feature make it appear to be the remnants of a recently burned tree.

Feature 2: This pit feature appeared at 30 cm below the surface and continued only 6 cm. Only one fourth of this pit was recognized as such during excavation but projected would probably have been 60 cm in diameter. The matrix was dark brown sandy clay with charcoal mottling. Debris from the pit consisted only of nine flake fragments and three pieces of shatter. Function of the pit was not apparent.

Feature 3: This was a dark stain with a sandy clay matrix. From its shape (circular and approximately 10 cm in diameter) and profile, it appeared to be a post mold. Only one flake and one piece of shatter were found in this post mold which was 10 cm deep.

Feature 4: The characteristics of this stain were almost identical to those of Feature 3. These two posts were 50 cm apart. This post mold contained no cultural material except charcoal and burnt earth mottling.

Feature 5: This feature originated at 20 cm below the surface and at the top was extremely amorphous. An area of dark brown soil between 40 cm and 90 cm wide running northeast to southwest appeared within the reddish, yellowish

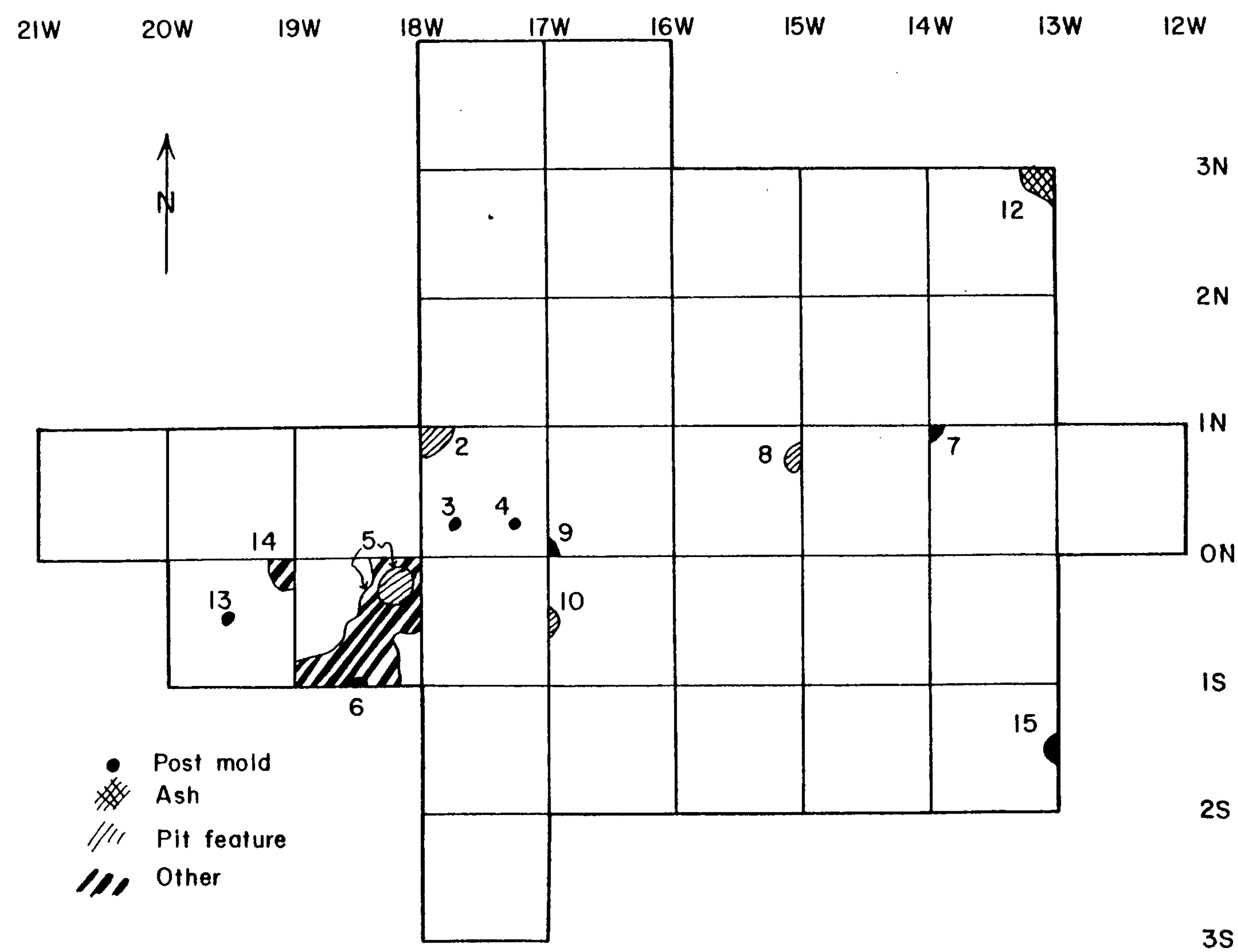


Figure 4.14. Plan of features excavated at 23BE676.

brown matrix. The soil was silty and compact. Originally this feature appeared to be the contact between two soil strata. However, at 30 cm below the surface, two areas of this darker soil became very distinct. The area in the northeast quadrant of 0N/18W was designated Feature 5. The other in the south wall of 0N/18W was designated Feature 6.

Feature 5 was a pit, irregularly shaped and approximately 35 cm in diameter. It contained little cultural debris with a few flecks of charcoal. The pit ended at 40 cm below ground surface, making it approximately 20 cm deep.

Feature 6: At 30 cm below ground surface, at the base of the dark brown soil area designated Feature 5, a distinct semi-circular area of dark soil appeared. This feature contained no cultural debris but was greyer , siltier and more friable than the surrounding matrix. In profile, it appeared to be a post mold tapering from 20 cm at its top to 12 cm wide at the base.

Feature 7: This feature, consisting of dark brown silty and friable soil, was similar in profile to the post mold (Feature 6) described above. It was 15 cm deep, starting at 20 cm below ground surface. Its diameter tapered from 20 cm at the top to 5 cm at its base. No lithic debris, tools or charcoal were present.

Feature 8: The function of this feature is unclear. Like Features 6 and 7 it was distinct from the surrounding matrix; it was a nearly circular area of greyish brown silty clay. The feature, however, was larger (28 cm north-south and 22 cm east-west) and deeper, extending from 30 cm to 70 cm below the surface. Several flake fragments were recovered from the fill. This may have been a small pit, root disturbance or perhaps a large post mold.

Feature 9: This dark reddish-brown soil was circular and approximately 20 cm in diameter. No debris or charcoal was present. Beginning at 30 cm below the surface, this feature was nearly square in cross-section ending at 32 cm below the surface. This may be another post mold or small pit.

Feature 10: This feature, only 40 cm to the south of Feature 9, is similar in size and type of fill. No debris was recovered. This feature was also 20 cm in diameter but was shallower (10 cm) and rounded, rather than square at the bottom. The function of this pit is unknown.

Feature 11: Rodent disturbance.

Feature 12: This was an ash feature exposed only in one corner. Projected dimensions would make this ash 45 cm

in diameter. No cultural material or charcoal was collected. The ash deposit, which was found between 12 cm and 19 cm below ground surface, appeared to represent many episodes of burning. Several layers of ash less than .5 cm thick were separated by even thinner bands of brown silty soil.

Feature 13: This feature is probably a post mold. It extended from 30 cm to 46 cm below ground surface and was 14 cm in diameter at the top, tapering to 5 cm at the bottom. The feature fill was medium brown silty soil with a few flake fragments.

Feature 14: This area was given a feature designation because of a tight concentration of tools and five cracked rock. No soil discoloration or anomalous texture was apparent. Lithics from the feature included two bifaces, two large chunks of chert, a fire-cracked rock, a large unmodified primary flake and a secondary flake. This material was found within a 20 cm^2 area between 35 cm and 41 cm below the surface.

Feature 15: This was a fairly compact, very dark brown post mold, extending from 18 cm to 50 cm below ground surface. At its top the diameter was 25 cm and tapered to 6 cm at the base. This post mold appeared very distinctly in profile (Fig. 4.11). No debris or charcoal was present in the fill.

The definition of soil anomalies which may have represented areas of activity or structural features was difficult. Many features appeared only in the corner of one unit, when logic would indicate that they extended into adjoining units. This difficulty in discerning features was probably due to the dark color of the upper midden. Features were most distinct when they intruded the lighter colored sub-stratum.

Several features which went unnoted during excavation appeared during profiling of the walls. Three areas in particular have profiles indicating that the natural stratigraphy has been altered by cultural activity. The first is in the area where Features 5, 6, 3 and 4 are located. The profile (Fig. 4.12) shows two areas (C) of disturbance. These were greyish brown, friable, and silty. While no structure to the features or the profile in this area is apparent, the density of post molds, pits and the areal extent of Feature 5 might indicate the presence of a structure such as a house. Similar areas of extensive disturbance of the natural stratigraphy occur along the north wall of the excavation block (Fig. 4.9) and the east wall of the block (Fig. 4.11). It is possible, particularly in the east where a post mold appeared (Feature 15), that there are several structures at the site. These areas represent, at least, very intensive activity on the terrace crest.

Collections

CERAMICS

A total of 175 ceramic sherds was recovered during the two phases of excavation at 23BE676. Forty-seven of these were too small for any type of morphological or constituent analyses ($\leq$ 1 cm^2). Fifty-two others were larger than 1 cm^2 but were still too fragmentary to determine temper, shape or surface treatment. Of the seventy-six remaining sherds, ten had grit as the major tempering material, one had granite, and the remaining sixty-six were limestone tempered. Both limestone- and grit-tempered sherds were found together in some unit/levels. Four sherds were cord-marked, forty-three had smoothed surfaces, one had tool impressions, and two had trailed lines. Surface treatment on the other specimens was not determinable. Vessel morphology for the ceramics at the site was similarly impossible to determine due to the fragmentary nature of the specimens. The distribution of ceramics at the site is given in Table E-4.3.

HISTORIC MATERIALS

Only three specimens were recovered which definitely relate to the historic period. Two pieces of rusted metal, probably iron, were found in the 10 to 20 cm level of 1N/13W. A single piece of glass was found on the western edge of the site in the first excavation level of 5N/44W. All three specimens were fairly close to the surface and are presumed to represent recent intrusion from modern activities at the site.

LITHICS

Artifacts

Projectile Points

A total of seventy-four specimens which could be classified as projectile points were recovered during the two phases of excavation at the Cootie Site. Six of those were too fragmentary to determine even the basic morphology and are classified as Category 999-unclassifiable.

There is only minor variation in the style of the remaining sixty-eight projectile points. Thirty-five, or over half, are contracting stemmed forms. All except two of these are classified as Standlee points (Category 332); one other is a Gary form (Category 330) and the other is too fragmentary to be classified as any style more specific than contracting stemmed (Category 331).

The remaining thirty-three points are of only ten different forms. Arrow points comprise the majority of these

specimens. Thirteen are Scallorn arrowpoints (Category 322), two are triangular Fresno arrows (Category 334), and five are unclassifiable arrows (Category 333), too small to be identified but probably are Scallorn points. Another specimen is a small corner-notched form with a concave base (Category 301) and may be classified as a very small dart point. Three other corner-notched specimens were recovered; one is too fragmented for classification (Category 364), another is typical of Snyders specimens from the Middle Woodland period (Category 317), and the third (Category 361) is small with rounded shoulders and base.

Three other basic forms of dart points were found at 23BE676. Two of these were basally notched with squared tangs and are classified as Smith points (Category 326). Five points had shallow side-notches and are Rice Side-Notched forms (Category 325). The final two specimens are straight-stemmed. One (Category 336) is medium-sized with a short stem. The other (Category 338) has angular shoulders and a squared base.

On the basis of projectile point form, at least two periods of prehistory appear to be represented by the assemblages at 23BE676. The Late Archaic period is represented by the Smith points, the two straight stemmed forms and perhaps the Standlee specimens. All except the Standlee forms are fairly well established diagnostic styles of the Late Archaic period. The temporal placement of Standlee points is somewhat less clear. In Oklahoma, Standlee points tend to appear earlier than the similarly shaped Gary form (Purrington 1971: 122) and may appear as early as 2000 years ago (Bell 1958: 38).

At the Cootie Site, Standlee points occur throughout the midden, from 50 cm where the Late Archaic forms appear to the upper 10 cm of deposit which contains Woodland point forms (Table E-4.4). Several point morphologies occur within the general Standlee type, with shape depending primarily on the outline of the juncture between the blade shoulders and the stem; some have rounded shoulders, some square and some have a rounded transition from blade to stem while others are very angular in that region. Both stratigraphic and areal distribution of the various morphological sub-types appear to be randomly patterned; no sub-group is spatially clustered. There appears, then, to be no pattern of change in shape of the Standlee specimens through time. A similar pattern was found in the distribution of various sub-types in Oklahoma (Purrington 1971: 122).

Most of the projectile points at 23BE676 are diagnostic of the Woodland period and some may date into the Mississippian period. The single Snyder specimen is typical of the Middle Woodland period in other areas of the midwest, but it may date to a slightly later period in southwest Missouri.

A few similar specimens were recovered from burial tumuli in the area which may date to the Late Woodland period (Goldberg, Vol. III). Scallorn arrowpoints and Rice Side-Notched darts probably also date to the Late Woodland period. The two small triangular Fresno arrow points are similar to specimens which have been recovered from Mississippian period assemblages and may date to as late as A.D. 1400.

Scrapers

A total of 252 scrapers were recovered from 23BE676 during the two phases of excavation (Tables E-4.2 and 4.4). Of these only seventeen are bifacially worked. The other 235 unifacial specimens can be classified into seven morphological types; there were 67 convex, 24 concave, 71 straight, 25 notched, 9 irregular, 30 generalized, and 9 spokeshaves. Both end and side scrapers were represented.

The distribution of the scrapers through various levels of the deposit is presented (Table E-4.5). The distribution of all sub-types of unifacially flaked scrapers is unimodal, normally peaking in the 10 to 20 cm level. A similar distribution is seen for the bifacial specimens. However, two types — irregular and spokeshave — reach their highest frequency in the 0 to 10 cm level, presumably the latest deposits at the site. Similarly, a large percentage of the notched scrapers occur in this first level. While this variance in the mode of occurrence of different sub-types is slight, particularly since the sample of spokeshave and irregular scrapers is small, a trend may be suggested. Tasks which required notched scrapers and spokeshaves may have become more frequent during the latest occupation at the site. The small number of scrapers in the lowest levels probably does not represent the same type of trend towards increased emphasis on tasks requiring scrapers. Rather, the low frequency is mirrored in a lower frequency of all tools and lithic debitage during the earliest occupation.

Bifaces

In addition to the projectile points and bifacially flaked scrapers described above, a variety of bifacial chert tools were recovered. In all, 223 specimens were placed in the general biface category. Of these the majority (175) were too fragmentary to be placed in a morphological subclass. Those which were more complete were of five shape classes; eleven were ovate, ten were acuminate, four were circular, and the remaining twenty-two can only be classified as generalized bifaces.

Other Chipped Stone Tools

A variety of other tools from 23BE676 were manufactured from chert and form a very complete assemblage in terms of

representing most of the tool forms found in the lithic sample from the reservoir. In addition to the numerous cutting implements categorized as bifaces, there were at least three other forms of cutting tools; there were fifteen knives, three denticulates, and five flake blades. Pointed implements, probably for engraving or drilling, were represented fairly well; there were four drills, five gravers, four perforators and one burin. Six other well made chert tools were recovered – five cleavers and one adze.

In addition to these finished forms, three other types of specimens representing earlier stages in lithic manufacture were present. A variety of cores and core fragments (90 in all) were recovered. Additionally, ten blanks and four preforms, combined with the high frequency of cores and other lithic debitage suggest that all stages of tool production occurred at the site.

Ground and Pecked Stone

Thirty pieces of stone were recovered which appear to be either manuports – not native to the site locus – or modified by prehistoric activity. Ten of these specimens are hematite and include three modified and seven unmodified pieces. Modified pieces include one tabular and one prismatic piece and one chunk (an irregular shaped piece with at least one modified surface). Three specimens are classified as hammerstones; they are pieces of chert which have been rounded by battering. Another naturally rounded cobble is classified as a mano, with evidence of having been used for grinding. Five small specimens which exhibit pitting on otherwise flat surfaces have been termed nutting stones. An additional eleven pieces of limestone or igneous rock from the site exhibit various degrees of smoothing from grinding or pitting from hammering or pecking.

Debitage

An extremely large sample of chert debris was recovered during the two phases of excavation at 23BE676 – evidence of the intensity of occupation at the site. A total of at least 42,608 pieces of chert representing various stages of lithic reduction have been described (Table E-4.6), in order to define the nature of lithic resource utilization and identify the activities which took place at the site.

Flakes were the most frequent form of debris accounting for 64.9% of the total (27,648 flakes). The majority of those were broken – 23,014 or 83.2%. Of the 4,634 complete flakes, 3,092 (66.7%) were unmodified. Of these 3,092 unmodified flakes, 160 (5.2%) were cortex or primary flakes, 510 (16.5%) were secondary, and the remaining 2,422 (78.3%) were tertiary. There were 998 complete flakes which had been modified by some form of battering or utilization. Only 31 (3.1%) were primary or cortex flakes, 220 (22.0%) were secondary, and (74.8%) were tertiary. The remaining 544, or 11.7% of the

complete flakes assemblage, were trim flakes, showing signs of having been removed from specimens which had been previously retouched.

Additional lithic debris from the Cootie Site includes both unmodified raw material and debitage from lithic production. There were 4,949 pieces of miscellaneous unmodified geologic rock and 32 pieces of unmodified chert (raw material). Tool manufacture debris includes 9,330 pieces of shatter and 649 chunks.

Chert Utilization

Chert data were collected from the lithics in three excavation units (Table E-4.7). It was postulated on the basis of naturally occurring chert sources in an area 1 km in diameter surrounding 23BE676 that chert would occur at the site in the following percentages: Jefferson City, 75%; Chouteau, 10%; Burlington, 15% (Ray, Vol. II). A comparison of the chert assemblage from the three test units to the expected percentages shows that non-local chert was used at the expense of the three locally available types. When totals of all three excavation units are combined, 54.9% Jefferson City, 7.5% Chouteau and 2.9% Burlington were present, while 34.7% of the chert was of unexpected types.

BOTANICAL REMAINS

A total of thirty-nine botanical samples from general excavation levels and features were submitted to Frances B. King, Illinois State Museum, for identification (Table E-4.8). Of these samples twenty-two contained only nut fragments; all were identified as hickory. Thirteen other samples contained only wood charcoal, ranging in weight from 0.1 grams to 1.5 grams. Identification of only two of these was possible; one was oak and the other hickory. Four additional samples contained both hickory nuts and unidentifiable wood charcoal.

Interpretations about subsistence or seasonality are impossible on the basis of these remains. Preservation was poor and the sample size is too small to be representative. It is probably not true that nuts were the only plant food being utilized. Both oak and hickory occur in the area today.

FAUNAL REMAINS

Preservation of bone at 23BE676 was almost non-existant. A few crumbly and usually calcined bones were recovered. All of these appeared to be from either medium or large mammals. Most bone at the site was in the form of bone meal and could not be collected.

Dating

All carbonized material that was encountered was removed from the site during excavation. These samples were extremely small and barely acceptable for botanical identifications. None even approached the size necessary for obtaining reliable Carbon-14 dates.

A series of Thermoluminescence samples were submitted to the University of Missouri and Dr. Ralph Rowlett for age determinations. Unfortunately, the site was inundated before arrangements could be made to obtain background radiation readings directly from the site. Therefore, soil samples originally removed for purposes of flotation recovery were used to obtain those readings; an average from all available soil samples was used. It appears that most, if not all, of the dates obtained from the 23BE676 samples are too early, based on normally acceptable temporal ranges for certain diagnostic artifacts from the site. Given the consistency of the apparent inaccuracy of these dates, it may be that the method for determining the background reading was inadequate. Alternately, the samples may have been exposed to an unknown level of radiation during the two years between the time they were excavated and the time they were dated.

The samples and the results of the thermoluminescence runs are as follows (see also Vol. I, Appendix B).

23BE676-1
Provenience: Feature 14 in 0N 19W, 30 to 40 cm below surface
Material: Limestone
Result: Did not respond to thermoluminescence.

23BE676-2
Provenience: Test Pit 1, 20 to 30 cm below surface
Material: Smith point (Category 326)
Result: 5854 ± 697 B.C.

23BE676-3
Provenience: 1N 22W, 20 to 30 cm below surface from a spatially distinct Standlee assemblage
Material: Chert
Result: 4283 ± 570 B.C.

23BE676-4
Provenience: 0N 15W, 20 to 30 cm below surface from a Standlee assemblage immediately below Late Woodland material
Material: Chert
Result: 2699 ± 421 B.C.

23BE676-5
Provenience: 1N 12W, 10 to 20 cm below surface from Late Woodland assemblage
Material: Chert
Result: 1528 ± 315 B.C.

23BE676-6
Provenience: 0N 17W, 10 to 20 cm below surface from Late Woodland assemblage
Material: Chert
Result: 58 ± 181 B.C.

Intra-Site Comparisons

VERTICAL

It can be seen from the occurrence of both artifacts (Table 4.4) and lithic debris (Table E-4.6) within various excavation levels that the distribution of cultural material is primarily unimodal. The exception to this modality is in the single deep excavation unit – 2N/13W – where a second small peak in debris density is reached between 80 and 120 cm below the surface. The presence of a Smith point just below this debris scatter indicates that some activity occurred during the Late Archaic period before the major occupation at the site.

The major occupation of 23BE676 is represented by the deposits in the upper 40 or 50 cm where the debris and tool density were highest. While there is almost always a unimodal distribution in debris frequency within this upper cultural deposit, the depth of the mode is variable. A schematic (Fig. 4.15) is presented to show the distribution of debris modes at various depths across the site. The three excavation levels in each excavation unit which have the highest frequency of debris (primarily flakes and shatter used for ranking) are ranked with the level of highest density indicated by the widest band. Levels with second and third highest density are symboled by decreasing width of the band.

From the schematic it can be seen that there is a pattern of increased frequency of cultural material at a lower depth in the western portion of the site. From between 18 meters and 19 meters west, proceeding west, the highest debris density is in the 20-30 cm level or below. Throughout most of the central and eastern part of the excavation units this mode is reached in the 10-20 cm level. In the north-central part of the excavation block, debris frequency peaks in the first level, i.e., between 0 and 10 cm.

This variability in the vertical distribution of material is probably related to occupation of the site during different periods. Throughout much of the midden, the major exception being in the west, there appear to be two separate

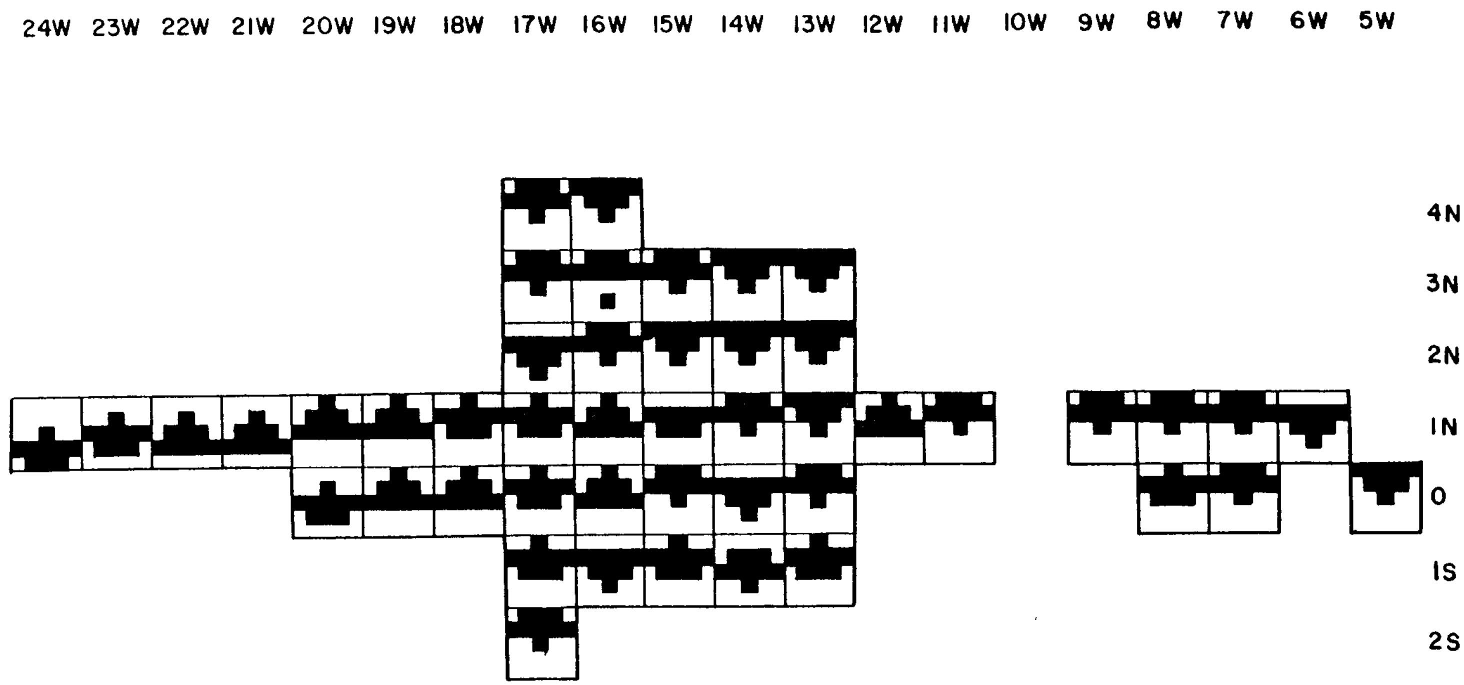


Figure 4.15. Rank/order distribution of debris density by excavation unit and level at 23BE676.

projectile point traditions mixed in the same deposits. There are arrow points, such as Scallorn and Fresno, and Rice Side-Notched and Gary dart points, mixed with the contracting stemmed Standlee forms. The exception in the west, where debris density increases with depth, is that Standlee forms are stratigraphically separate from the arrows, Gary and Rice Side-Notched specimens.

Both the arrows and Rice Side-Notched points are firmly dated to the Late Woodland period, probably sometime after A.D. 700. Contracting stemmed forms are less well known temporally. In Oklahoma, there appears to be independent origin of the Standlee and Gary forms with Standlee appearing earlier (Purrington 1971: 122), perhaps as early as 2,000 years ago (Bell 1958: 38). Purrington states that Standlee points may have been a modified later form of the early Hidden Valley and Searcy forms from the Ozarks. There is some evidence, then, that the deeper deposits in the west represent an earlier occupation than that represented by the Late Woodland arrows and Rice Side-Notched assemblage. The co-occurrence of Standlee forms with the later types is somewhat problematical. It is not clear whether this mixture represents cultural continuity of the Standlee form into the Late Woodland period or whether there is physical mixing of cultural deposits throughout much of the site.

The set of thermoluminescence dates from the site does little to clarify the situation. It appears that all of the dates from 23BE676 are too early. It was expected that the date of the earliest Smith component at the site would be around 2,000 or 3,000 B.C. The date obtained from a Smith specimen was 5854±697 B.C. If the problem with the thermoluminescence results lies with inadequacies of measuring the background radiation, the dates may be consistently incorrect. If that is the case, perhaps relative dating based on the results is instructive. The two dates obtained from the Standlee assemblage (4283±570 B.C. and 2699±421 B.C.) are indeed earlier than the dates from the Scallorn/Rice Side-Notched assemblage (1528±315 B.C. and 58±181 B.C.) and later than that from the Smith component. It is likely that there are three components at 23BE676, but the extent of physical mixing of the deposits cannot be established.

HORIZONTAL

While it appears that there are at least three components at the Cootie Site, the lack of physical separation of the upper two and the minimal exposure of the lowest make it difficult to discern spatial patterning within any given component. There is some stratigraphic separation of the last two components in the western portion of the site, but the majority of the deposits may be mixed. This mixing situation is compounded on the eastern slope of the site, where

most of the cultural material is in the first two levels. There is evidence, at least in Test Pit 1 where a Late Archaic Smith point was found with Scallorn arrows, that the deposits in the east are extremely deflated.

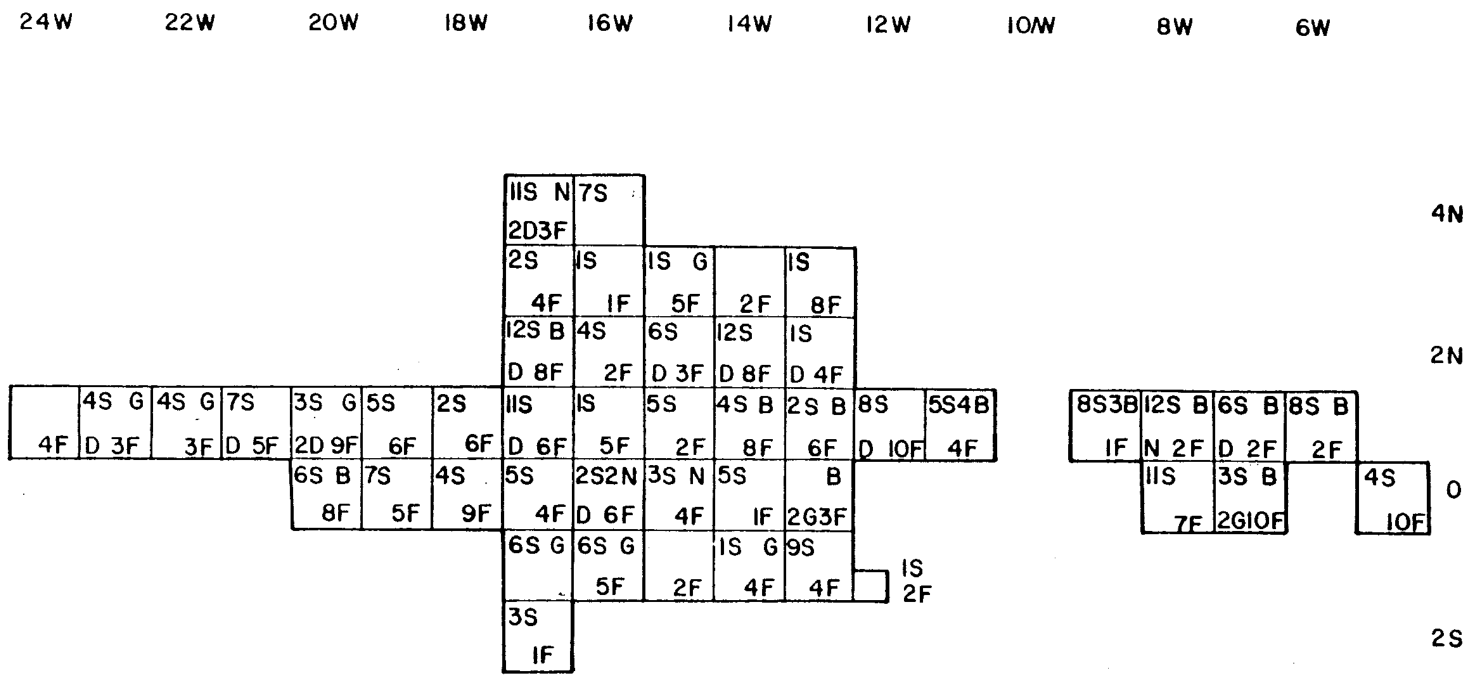
Some horizontal patterning within 23BE676 can be discerned. Interpretation of such patterning must be approached with great caution until such time as assemblages from different components can be separated. Without such separation, patterning within one component may obscure patterning from another.

There is only one area in the site which has a cluster of features which might indicate the presence of a structure. In the southwestern portion of the excavation block, there is a group of eight features in a semi-ovular configuration (Fig. 4.14). Five of these are post molds which surround Feature 5 which is an amorphous area of dark soil. Within this dark soil is a circular pit feature. Near the edge of the oval are two additional features – another pit on the east and a concentration of rocks and tools in the northwest. From the configuration of these features it seems likely that this was a structure – perhaps a house. Most of these features appeared at approximately 20 cm below the ground surface and are probably associated with the latest occupation of the site.

Two other pit features and post molds, as well as an ash concentration, may indicate loci of other centralization of activity at the site (Fig. 4.14). Several other features may have been missed during the excavations, particularly since anomalous soil became apparent only at the contact zone between the upper dark midden and the lighter clay below.

The horizontal distribution of various tool and debris classes is shown schematically (Figs. 4.16 and 4.17). These are composites from all levels of the excavation and therefore represent material from probably two components. The amount of cultural material excavated from the earliest Late Archaic component was negligible.

The first schematic (Fig. 4.16) shows the distribution of well made tools which were probably used for various subsistence related tasks, such as food-getting and preparation, woodworking and hide working. Several clusters of various tool types are apparent. Bifacial scrapers tend to be clustered in the eastern part of the site, with fourteen of sixteen recovered east of the 15 West line. While unifacial scrapers were found throughout the site there were three concentrations – one at 8 West, another at 14W/2N, and a third at 17 West. Groundstone appears to be fairly well dispersed through the site, as are the nutting stones, but with slightly more found in the west. Similarly, pointed tools for drilling and perforating are found throughout the site, as are bifaces and biface fragments.



S= Unifacial scraper
B= Bifacial scraper
G= Groundstone or mano
N= Nutting stone
D= Drill, graver, burin, perforator
F= Biface or biface fragment

Figure 4.16. Frequency and distribution of well-made tools at 23BE676.

Without component separation and functional analysis of morphological types of tools, no interpretation of distribution of specific activities at the site can be offered. While the clustering of bifacial scrapers is significant, no specific function can be attributed to these tools. The distribution of tools indicative of many different tasks appears to be fairly random, perhaps indicating the absence of specific activity areas within the site. If the assemblages from the two components were separated, this pattern might be different.

The second schematic (Fig. 4.17) shows those materials associated with lithic tool manufacture. There does not appear to be any significant correlation between the number of cores and the number of hammerstones, presumably used for their reduction. Neither is there a correlation between the number of cores and the number of primary flakes, probably struck from them, or the number of preforms and blanks resulting from the manufacture process. Lithic manufacture may have been a randomly distributed activity across the site. Once again, separation of assemblages from the two components is necessary to confirm such an interpretation.

Conclusions

The Cootie Site, 23BE676, appears to have been intensively occupied during the Late Woodland period, probably sometime between A.D. 700 and 1000. Most of the remains are probably attributable to this occupation. Prior to this, there was probably another occupation characterized by the presence of Standlee dart points stratigraphically below the Late Woodland assemblage. This second occupation occurred sometime after the first useage of the site by a Late Archaic group whose tool kit included basally-notched Smith points.

The function of the site and the extent of occupation during the earliest period is impossible to assess; only one excavation unit cross-cut it. Based on the low debris density encountered in that unit within the Late Archaic assemblage, it appears that activity may have been minimal. The Smith point was the only tool recovered from that depth and serves to date that occupation indirectly to approximately 2,000 B.C.

The second occupation of the Cootie Site is similarly difficult to characterize. Only a small portion of this component was stratigraphically isolated from the Late Woodland component. It is not clear whether the presence of Standlee points in the later assemblage is due to continuity of the form or physical mixing of assemblages. Possibly due to either of these reasons, the isolable Standlee assemblage is not appreciably different from the latest assemblage at the site. Tool forms and debris densities are similar. The only major differences appear to be in terms of structural features and possibly extent of the occupation. The features

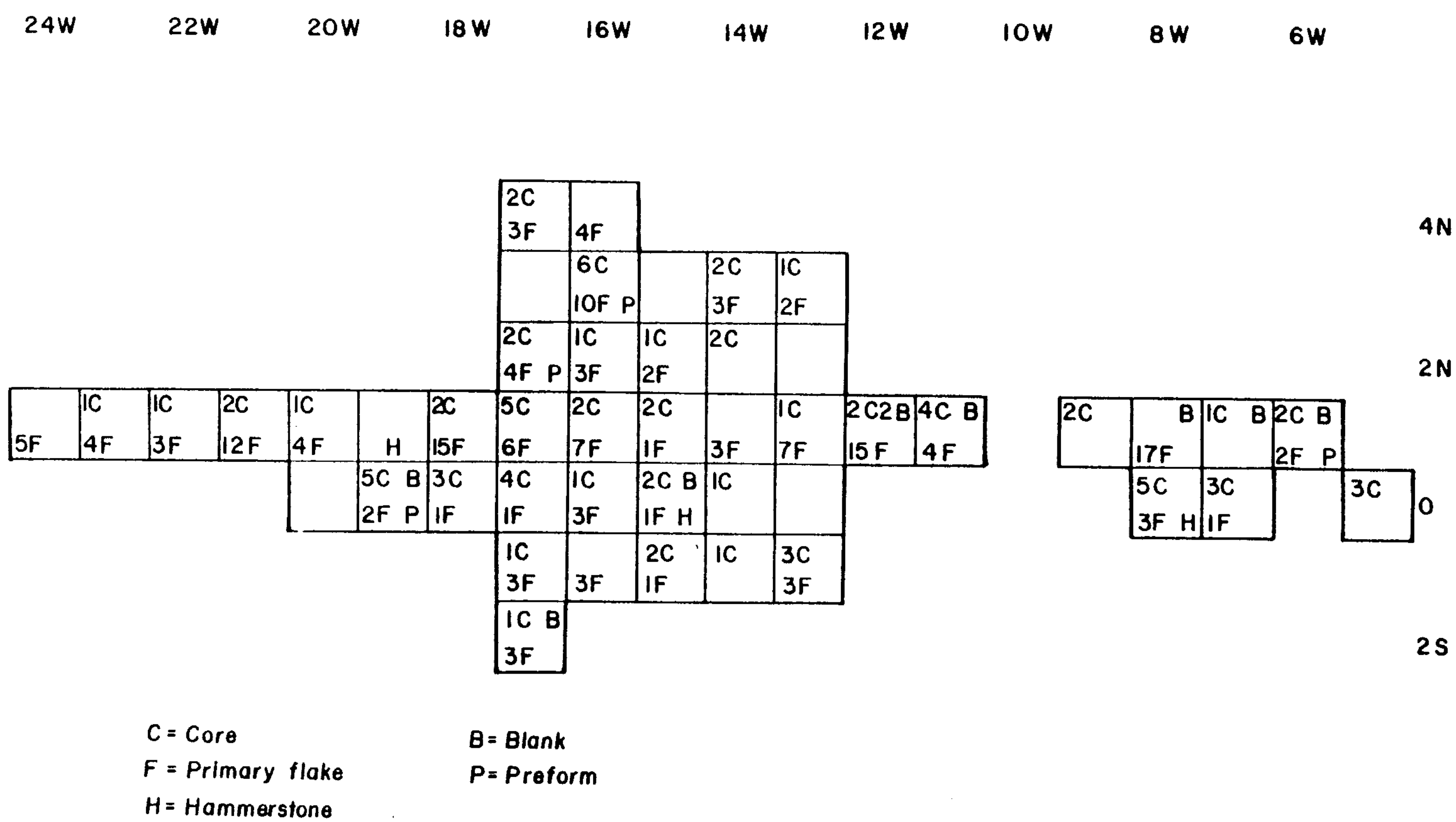


Figure 4.17. Frequency and distribution of lithic manufacture indicators at 23BE676.

at the site are probably attributable to the Late Woodland component and the size of the activity area during the Standlee component occupation is not measurable. The dates of this occupation are also unknown. There was some pottery present in levels which contained only Standlee points. Thus, the occupation was probably during the Woodland period.

The final occupation of 23BE676 was the most intense of the three. Debris and tool density was extremely high. Also, the presence of structural features indicates that there was some degree of permanence to the occupation. This component can be dated indirectly to sometime after A.D. 700 when arrowpoints were probably introduced to the area, and may be as late as A.D. 1000 when triangular Fresno arrow points were typical.

The range of activities indicated by the tools in this assemblage was very broad. Hunting activities are represented by a large number of projectiles. Butchering and woodworking are indicated by a high frequency and diversity of bifaces, knives, blades and scrapers. Drilling and perhaps engraving activities were prevalent with a number of drills, perforators, burins and gravers in the deposits. Subsistence was apparently not limited to hunting. A number of groundstone pieces, a mano, and several nutting stones were probably used for processing vegetal matter such as the hickory nuts found in the midden. There is no evidence that any type of seed or grain was being used.

Lithic manufacture seems also to have been a major activity at the site. All stages of lithic reduction are represented by debris and specimens in the assemblage. Cores and primary flakes are quite abundant and represent the initial stages. Several blanks and preforms indicate an intermediate stage in production. Finally, 68.4% of the complete flakes at the site were tertiary forms, representing the final reduction stage. This percentage is somewhat lower than at most other sites in the study area, being an indication of the relative importance of the initial stages of reduction when primary and secondary flakes are produced. Additionally, tool maintenance is represented by the 11.7% of the complete flakes which were trim flakes.

Given the size and the density of the deposits at 23BE676, it appears that the site was occupied fairly intensively. The structural features indicate a degree of permanence. The diversity of tools represents a variety of activities. These factors seem to indicate that the site served as a base camp. It seems to be in an ideal location, being on a major river and at the base of a bluff, for exploitation of a variety of resources. The size of the resident population may have been fairly small since the size of the site is relatively small. The seasonality and duration of the occupation is unknown.

Recommendations

As the Cootie Site has been inundated since 1977, there is little hope that future field investigations could be carried out. However, there was a huge body of data collected in the short time that excavations were possible. This report represents a basic description of the site, techniques used, and materials recovered. Interpretations are minimal and are based primarily on unquantified subjective comparisons. There is some evidence that two components are represented in the upper portion of the deposits. Without further analysis the assemblages from these components will remain inseparable. It is hoped that through more detailed analysis, primarily multivariate statistics, that the relationship between the Standlee component and the Late Woodland component will be understood. Only then can a detailed assemblage analysis of each component and functional determinations be done. The large data base from the site, particularly with a high frequency and variety of tools, lends itself to such a multivariate analysis.

Further analysis takes on special importance at 23BE676 because of the apparent intensity of its Standlee component. The temporal position of occupations characterized by contracting-stemmed forms in the Ozarks remains uncertain. Similarly, the relationship of Gary and Standlee forms is unclear. This site contains the largest excavated collection of Standlee points in the study area. If the parameters of this occupation could be discerned and its relationship to the Late Woodland assemblage, it would greatly enhance our knowledge of an unknown cultural node in the area.

References Cited

Allgood, Ferris P. and Ival D. Persinger
1979 Missouri general soil map and soil association descriptions. U. S. Department of Agriculture, Soil Conservation Service State Office, Columbia, Missouri.

Bell, Robert E.
1958 Guide to the identification of certain American Indian projectile points. Oklahoma Anthropological Society Special Bulletin 1.

Purrington, Burton L.
1971 The prehistory of Delaware County, Oklahoma: cultural continuity and change on the western Ozark periphery. Unpublished Ph.D. dissertation, University of Wisconsin-Madison.

CHAPTER 5

THE CROSS TIMBERS SITE – 23HI297

by

Susan K. Goldberg and Patricia A. Oman

Introduction

The site designated 23HI297 and known as the Cross Timbers site is located along the left bank (looking downstream) of the Pomme de Terre River in the Center Township of Hickory County, Missouri (Fig. 5.1). It is at an elevation of between 715' and 724' MSL, and the southernmost portion of the site is approximately 50 meters from the river. It is bounded on the east by county road Y. Although the site may have been bisected by the road, it was not possible to determine this as the land to the east of the road is private property. The western area of the site is bounded by an intermittent creek. Just north of the site is a spring, and another spring is located to the west of county road Y, within an area of high artifact density. The previous owner of the property stated that a ditch had been cut east-west through the site in order to drain the spring water from the field (Palmer, personal communication). Mr. Palmer also said that these springs had never, to his knowledge, run dry.

Mr. Palmer and another local informant state that the site had at one time been in "big timber"; the trees had been cleared sometime between thirty and seventy years ago. Prior to construction of Pomme de Terre Dam, the site was subject to occasional heavy flooding in the springtime. At the time of the survey, the site area was in pasture; it had not been cultivated for the previous four to five years (Palmer, personal communication). Surface visibility was poor; the site was discovered and parameters for it defined by shovel testing and limited surface collecting. Eight shovel tests were put in on the lower T-0 terrace (Fig. 5.2); two of these contained no cultural material. Eighteen shovel tests were dug in the upper T-1 terrace, including a series of shovel tests along the drainage ditch (Fig. 5.2). This series contained no cultural material.

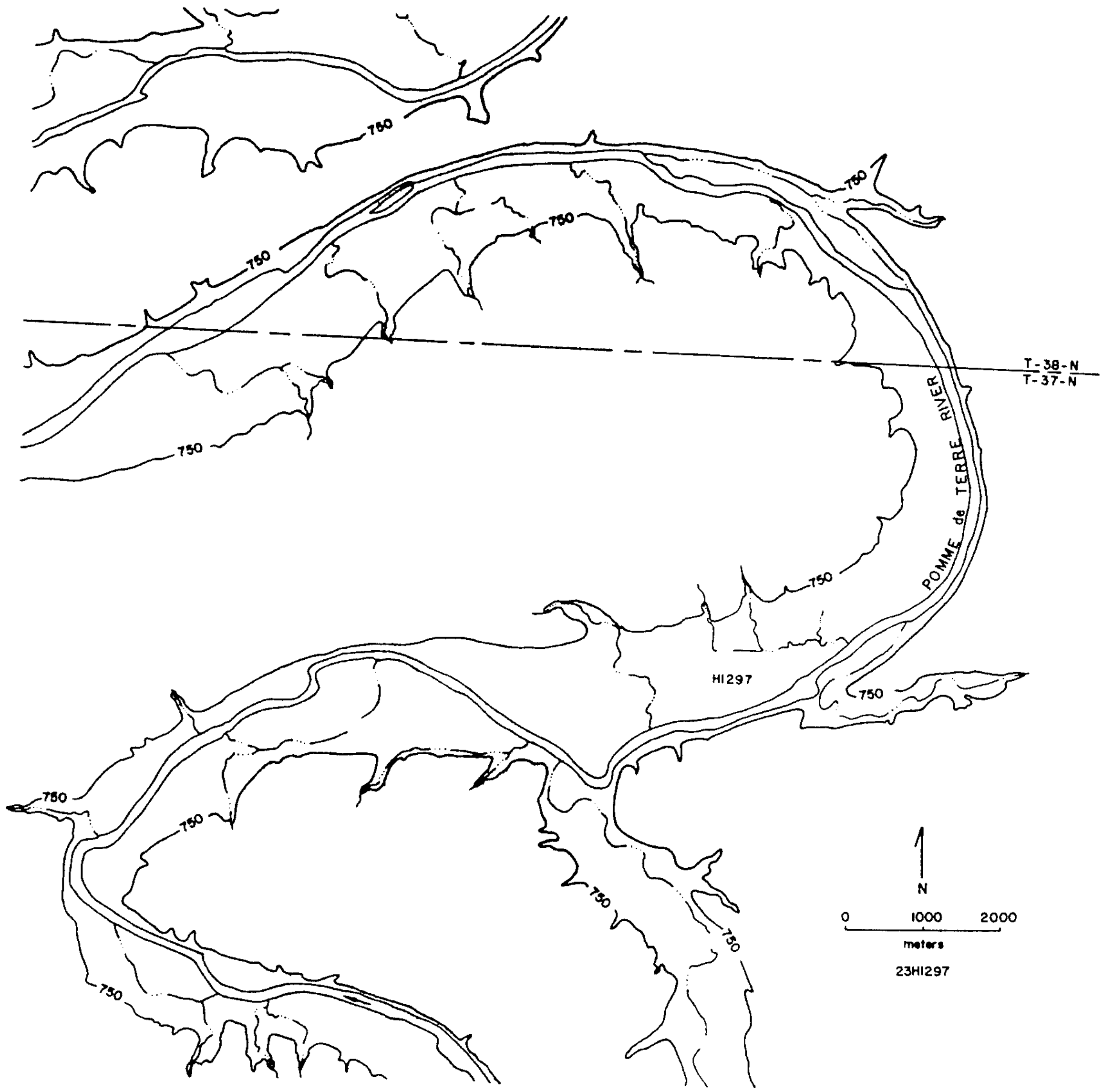


Figure 5.1. General location map of 23HI297.

FIGURE NOT AVAILABLE

Figure 5.2. Survey and shovel test map of 23HI297.

On the basis of these shovel tests, three areas of cultural activity were delineated. These were presumed to be the loci of one site. With very heavy ground cover precluding the possibility of doing a more controlled surface collection, this seemed a reasonable assumption at the time. Locus I is located on the T-0, east of an intermittent stream, approximately 50 meters north of the Pomme de Terre River (Fig. 5.2). It is west of county road Y and does not appear to continue into the field to the east of the road.

Loci II and III are north of Locus I, approximately 200 meters from the Pomme de Terre on the T-1 (Fig. 5.2). Locus II, as determined by the shovel testing and surface collection, extends across the county road; within it is one of the perennial springs. The shovel tests revealed that cultural material in this area extended to a greater depth than in Locus I or III, occurring at over 60 cm below the surface.

Locus III is a small area just to the east of the intermittent stream. Of three shovel tests placed in this area, only one contained cultural material; additional material was collected from the surface.

On the basis of the survey data, it was decided that 23HI297 might contain the kind of archeological information necessary to help define the temporal sequence of prehistoric cultural activity within the study area. Both Archaic and Woodland material was present. The depth of the deposits suggested that a fairly long time span may have been represented at the site, thus providing information about the somewhat poorly known Archaic period. Moreover, with such a deep deposit, the chances were good that there would be preserved stratigraphy, allowing a study of the relationship between a Woodland and an Archaic component.

Excavation

A grid for excavation units was placed with a hypothetical 0,0 point at the southeast corner of the site locality (Fig. 5.3). The designation for each unit refers to the distance in meters, north and west from this datum to the southwest corner of each excavation unit.

Criteria for placing test units included a variety of factors. As this locality was slated for construction for use as a public access area, it was mandatory to test areas that would be impacted. The lower terrace, Locus I, was to be landscaped, with earth removal and filling, for use as a boat ramp. The upper terrace was to be impacted less directly in terms of earth moving, but the plan for picnicking and recreation facilities suggested that an indirect impact would be felt in that area. Thus, both Locus I and Locus II were tested. Locus III was the most removed from anticipated

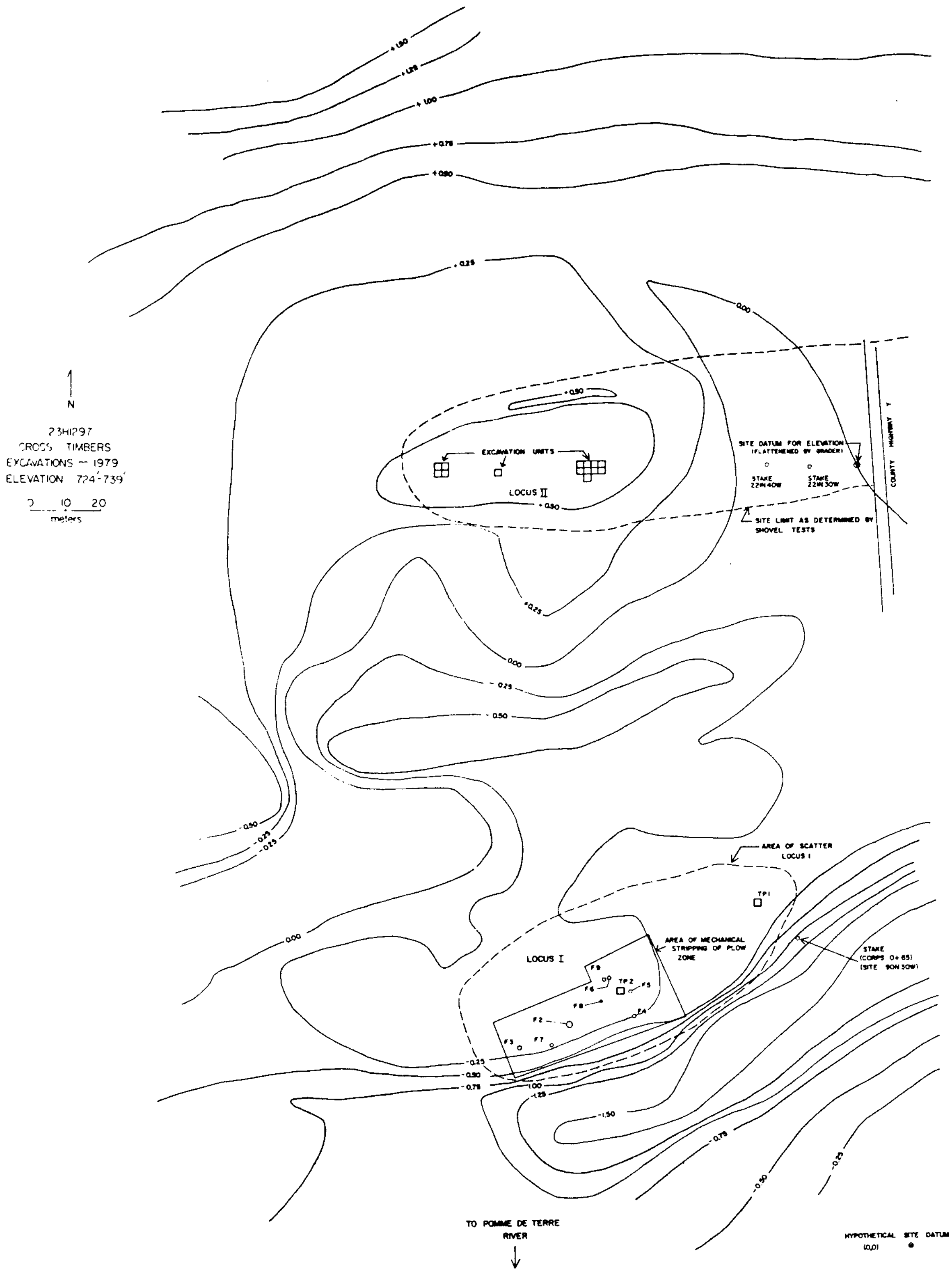


Figure 5.3. Topographic map of 23HI297 showing areas of scatter and excavation units.

impact and contained fewer and shallower cultural deposits. Thus, Locus III was not tested beyond the initial shovel testing.

The location of various test units within Locus I and Locus II was dependent upon the microterrain and the results of the initial shovel testing. Areas where testing had revealed the deepest intact deposits were chosen. Also, an effort was made to obtain a well distributed areal sample of each locus.

The microterrain in the southern part of the site, i.e., Locus I, included a slight rise where the scatter of lithic material was apparent, so a 2 x 2 meter test unit (Test Pit 2) was placed within this rise at 73N/82W (Fig. 5.3). Another 2 x 2 meter unit (Test Pit 1) was put in an 98N/43W, on the eastern edge of the cultural material scatter of Locus I.

The plowzone was taken out as an entity in both 2 x 2's. Thereafter, the units were dug in arbitrary 10 cm levels with the first 0-10 cm level of uncultivated soil designated level 01, the 10-20 cm level designated 02, etc. All soil including the plowzone was screened through 1/4" wire mesh.

The unit 73N/82W was dug to a depth of 60 cm below the plowzone or 85 cm below the surface. Level 05, 50-60 cm below the plowzone, showed diminishing amounts of cultural material. The dirt from the north half of this unit at this level was screened; that from the south half was carefully skim-shoveled. The cultural material recovered using these two techniques did not vary significantly.

Unit 98N/43W (Test Pit 1) was dug to 30 cm below the plowzone in the southeast 1 x 1 meter portion of the unit. Cultural material was sparse throughout all the subplowzone levels, and shovel testing during the survey indicated that cultural deposits here were not very deep.

In addition to the test units 73N/82W and 98N/43W, it was decided to mechanically remove the plowzone in the area of Locus 1 in order to find possible house floors or other activity areas. It had been suggested that the lack of structural features within open sites in the area was due to sampling problems inherent in small excavation units; it is not likely that a housefloor, for instance, would be recognized within a 2 x 2 meter excavation unit. Larger areal exposure was necessary for recognition of large features and intrasite activity patterns. Since the site in this area was due to be bulldozed in order to clear surface vegetation prior to construction of a parking lot and boat ramp, this was considered a reasonable course of action.

After the removal of the plowzone, the entire area was skim-shoveled by a crew of eight people in order to remove the

loose dirt and tread marks left by the front-end loader. This revealed a number of features, including post-molds. However, no clear post-mold pattern was apparent. All of the features were excavated. The results of this investigation are discussed in sections below.

Two 2 x 2 meter units were also started at 221N/86W and 221N/130W in Locus II. These areas were eventually expanded, and a total of fourteen 2 x 2 meter units were excavated in this locus (Fig. 5.3). The plowzone of six units was screened through 1/4" mesh; in eight of the units, the plowzone was simply shoveled out. All the subplowzone soil was screened, except for some of the deeper levels in 221N/130W. At the end of the field season, it became necessary to quickly sample the deposits below the major component at the site. In the interest of time, one unit was carefully shovel-skimmed and then removed with a mattock without screening.

Stratigraphy

The soil stratigraphy at 23HI297 varies between Locus I and Locus II. At Locus 1, which is on the T-0, there are only two definable soil zones. The plowzone, a culturally produced horizon, is loose, dark brown soil (10YR3/3) which varies in depth from approximately 20 to 30 cm below the surface. The subplowzone soil is an alluvial silt which shows increased clay content with depth; it is medium greyish brown in color. In terms of natural deposits, the excavated Locus I soil is probably entirely composed of Pippins alluvium, which is a fine-grained loamy silt.

As can be seen from the profiles of the units 98N/41W and 73N/82W (Fig. 5.4), the plowzone varied in depth. Although the site had not been cultivated in several years, the difference in color and texture between plowzone and subplowzone soil was quite distinct. This contrast became even more apparent after heavy wetting. Pedoturbation, primarily by earthworms, rodents, and tree roots, had blurred the interface. In some areas rodent activity probably accounts for the irregularities in the plowzone interface; throughout the site, the depth of the plowing appeared fairly uniform. In the Locus II area, for example, the greatest depth of the plowzone is seen in the profile of the north wall of Unit 221N/86W, where it dips to 32 cm below the ground surface. At the shallowest, it is 18 cm thick in Unit 219N/132W.

In the Locus II area there were two major excavation areas (Fig. 5.5), which for convenience are designated the east and west excavation blocks. In the west block, there were similar soil profiles along the 219N line, the 132W line, and the 223N line (Fig. 5.6). The plowzone (Zone A) is dark brown (10YR3/3) and loose with a high organic matter content. The underlying Zone B is a silty brownish grey (10YR4/2).

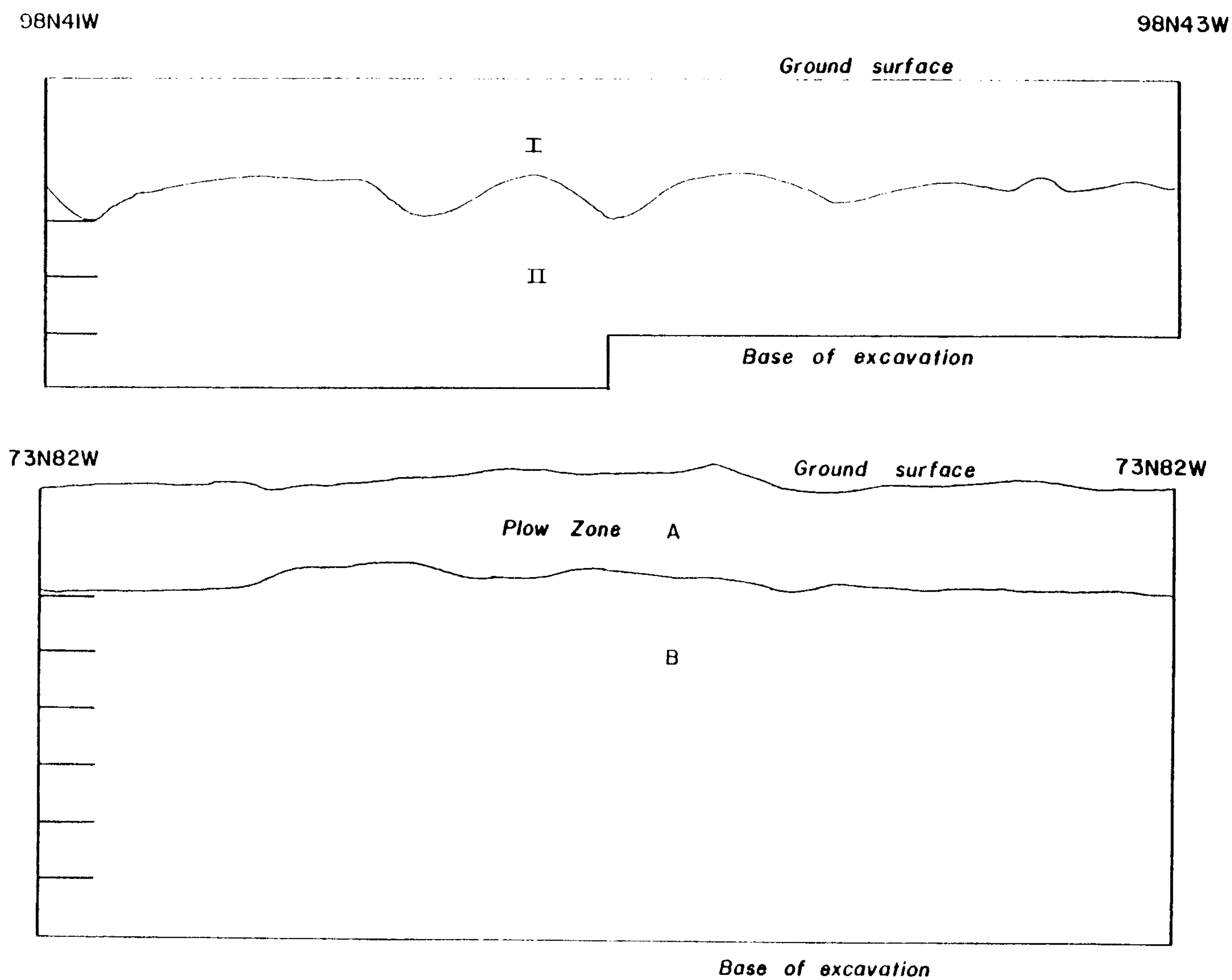


Figure 5.4. Profiles of test units - 23HI297, Locus I.

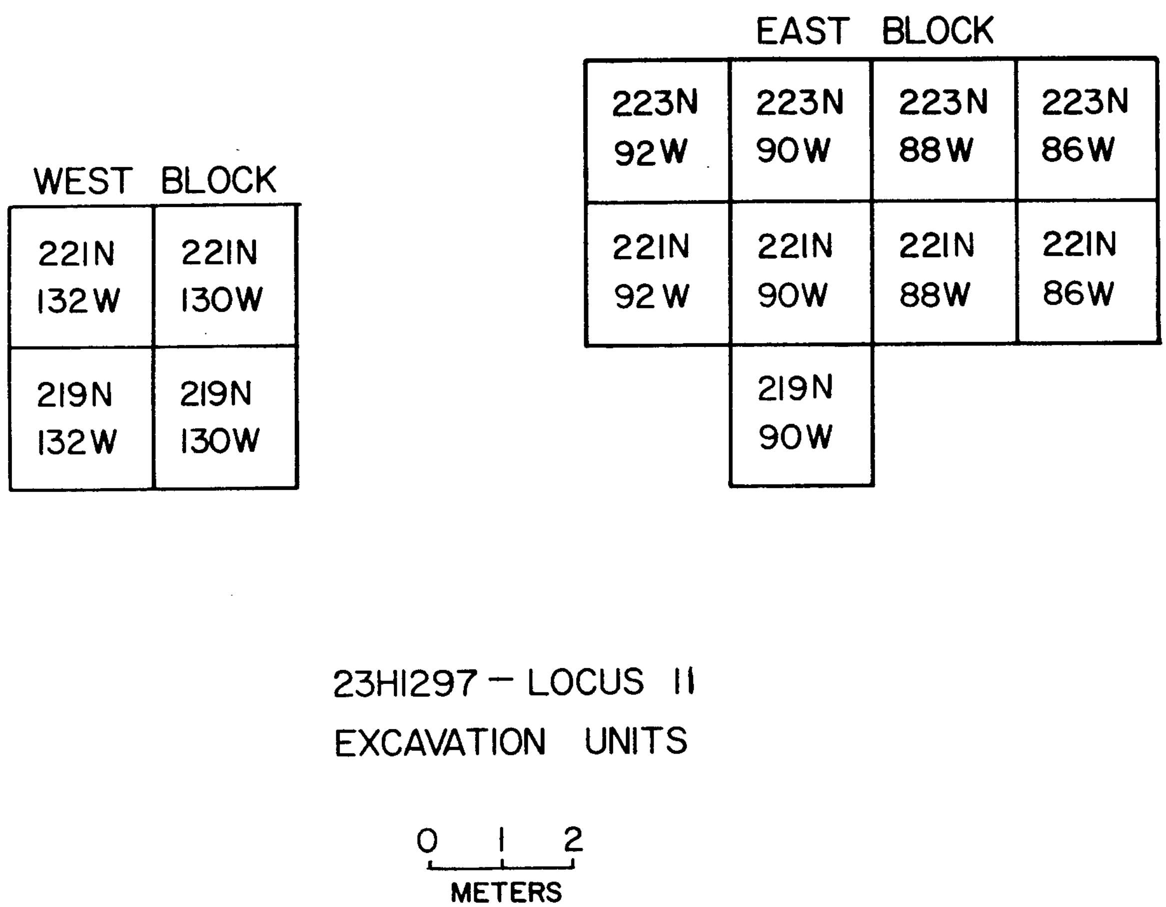


Figure 5.5. Plan of excavations, 23HI297, Locus II.

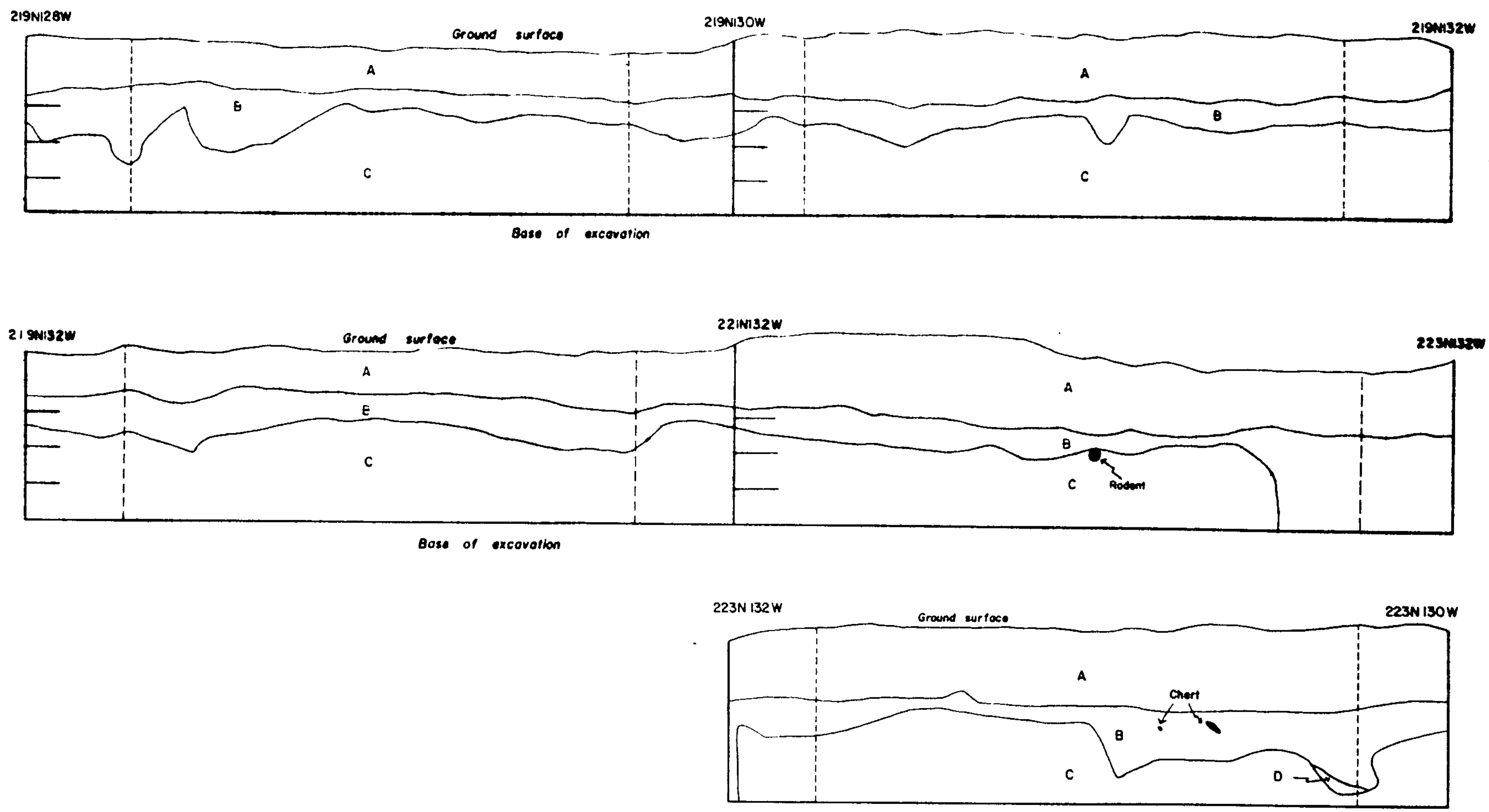


Figure 5.6. Profiles of excavation units, 23HI297, Locus II, West.

Zone C, which has a moderate clay content, is heavily mottled with orange-brown and grey patches; it is 10YR5/2 (light brownish grey) in color. Finally, at the base of a feature in Unit 221N/132W, there is a small deposit (Zone D) of grey silt (10YR7/2) with varves.

Also in the west excavation block are profiles for the 128 west line, the 130 west line, and the 221 north line (Fig. 5.7) which show similar development of the A (plow) and B zones. The C zone is dark yellowish brown (10YR4/4) with large grey mottles (10YR5/4, 10YR5/3) and a high clay content. There is also a soil zone D that appears as deeper levels and is yellowish-brown (10YR4/6) with gray clay mottles (10YR4/4) (Fig. 5.7). The mottling is less extensive than in Zone C but there is a higher clay content throughout the soil of Zone D. In the deepest 1 x 1 meter unit that was excavated in this area, the soil had the characteristics of a true clay with very little silt or inclusions. It also became increasingly moist with depth, and at 150 cm below the surface was very wet.

Midway between the western excavation block and the eastern block was a 2 x 2 meter unit located at 221N/115W. The plowzone in this unit was also dark brown (10YR3/3) and high in organic content with depth varying from 8 to 18 cm (Fig. 5.8). Zone B was a silty, medium to greyish brown (10YR4/3). Zone C appeared to be a transition zone between B and D, with some clay and was 10YR5/3, brown, in color. Zone D was greyish-brown (10YR5/2) and had a high clay content.

In the eastern excavation block the soil development was similar to that of the western block but with more soil anomalies caused by cultural activity. The plowzone was similar to that in the other excavation units. Zone B, however, was more greyish in color (10YR4/2). This zone was not homogeneous, but rather a silty mix of predominantly dark brown soil with yellow and grey mottles. This soil was the result of cultural activity. Zone C along the 88 and 84W lines (Fig. 5.9) was brown (10YR5/3) with dark yellowish brown mottles (10YR4/4). This was also the case along the 90W and 219N lines (Fig. 5.10). Zone C of 225N, 223N, and 221N appeared to be a mottled zone of 10YR5/2 (light greyish brown) and 10YR4/3 (brown) (Fig. 5.11).

Areas of soil that are marked D vary widely in color. Along the 88 and 84 lines, this was darker soil, loose and with charcoal present (10YR3/2). In the 90W and 219N lines, D zone soil was 10YR4/1 and was lighter and coarser than Zone B. Here it may represent a mixture of Zone B and Zone C, possibly brought about by pedoturbation. In the 225, 223, and 221 N lines, the D zone soil appeared to be 10YR5/4 (yellowish brown) in color, with manganese concretions.

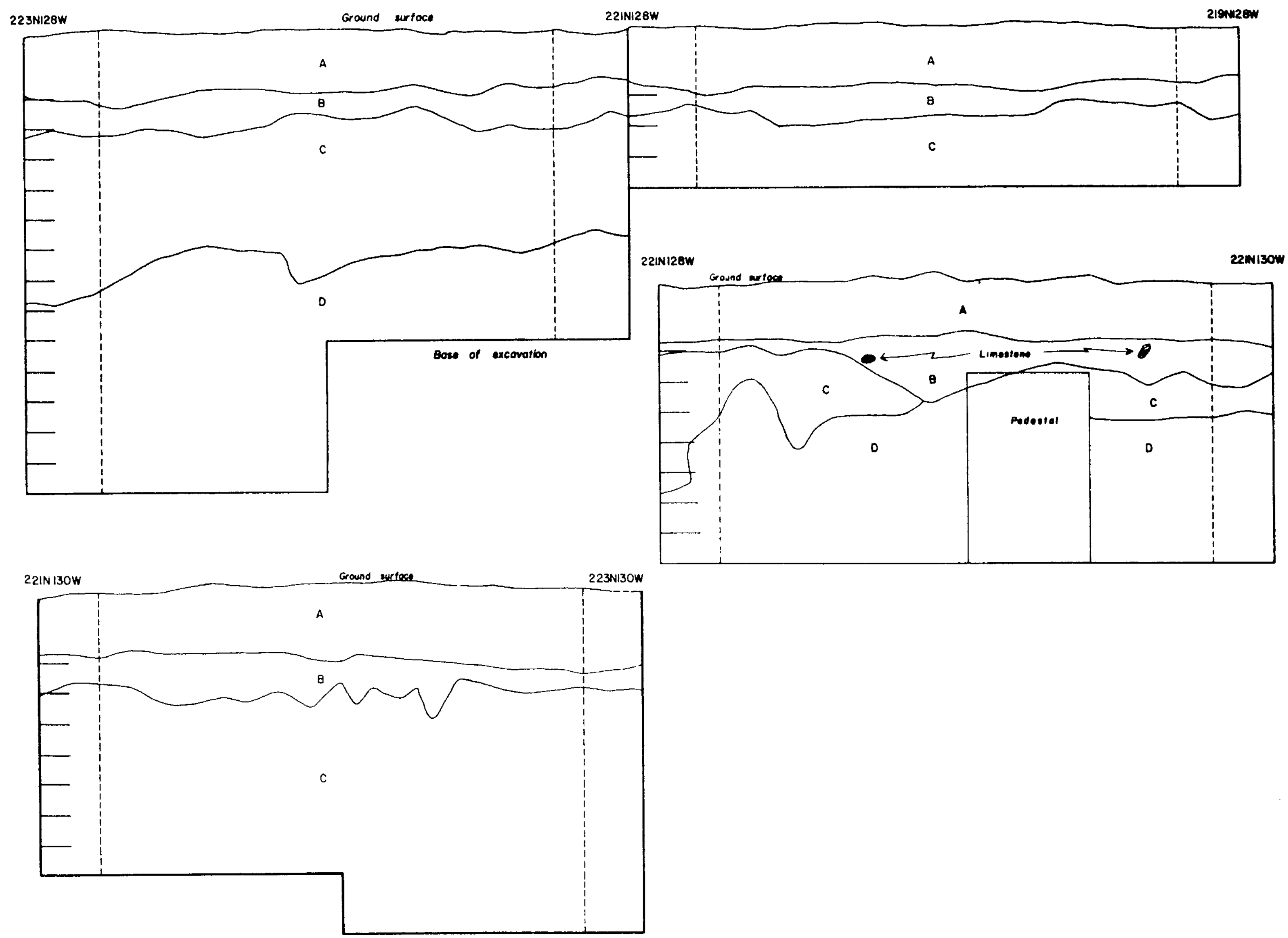


Figure 5.7. Profiles of excavation units, 23HI297, Locus II-West.

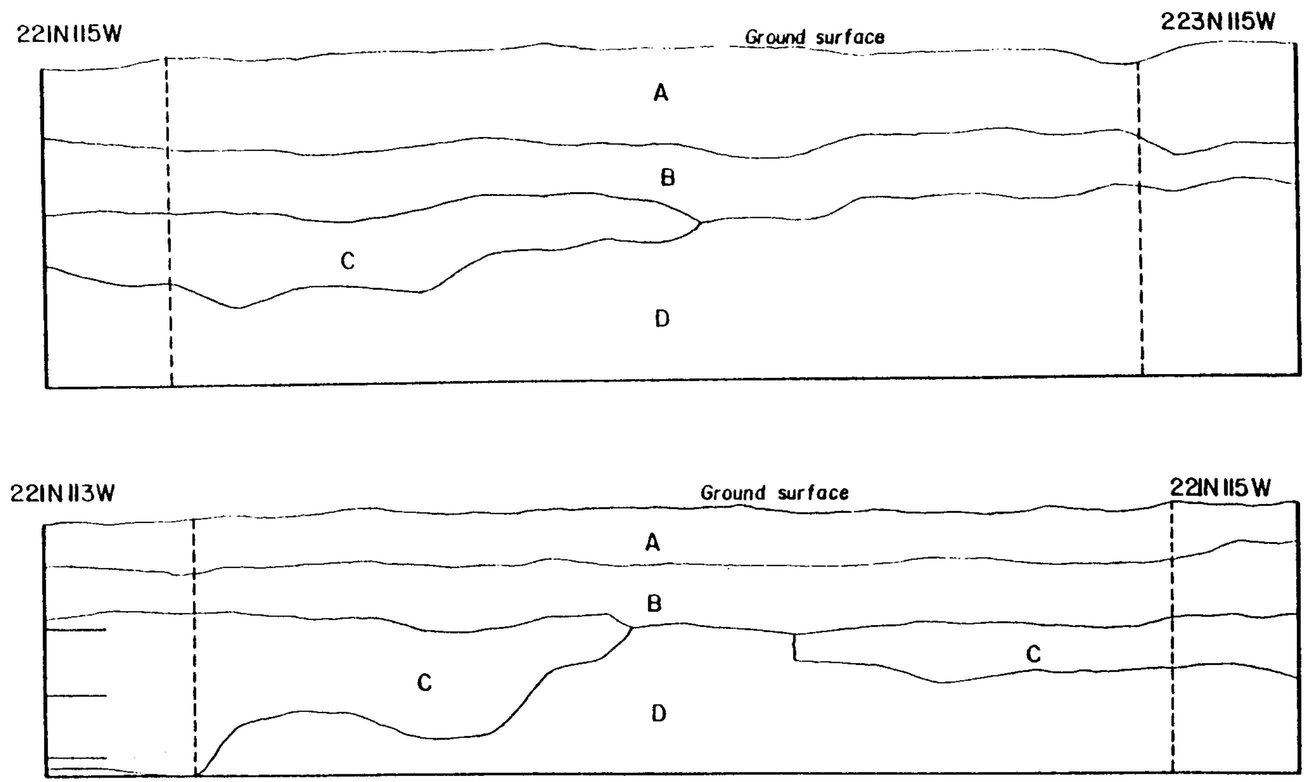


Figure 5.8. Profiles of excavation units, 23HI297, Locus II.

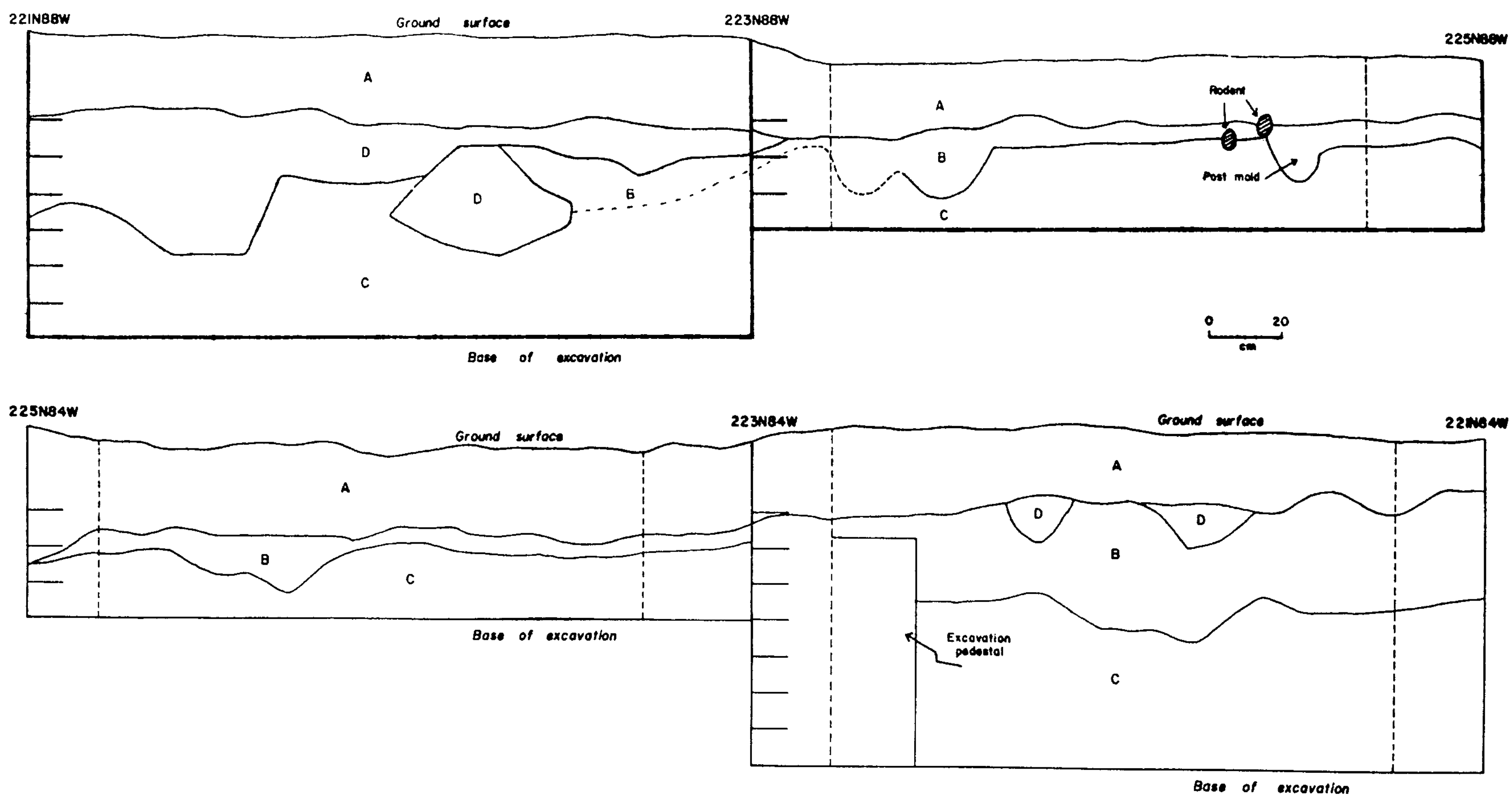


Figure 5.9. Profiles of excavation units, 23HI297, Locus II-East.

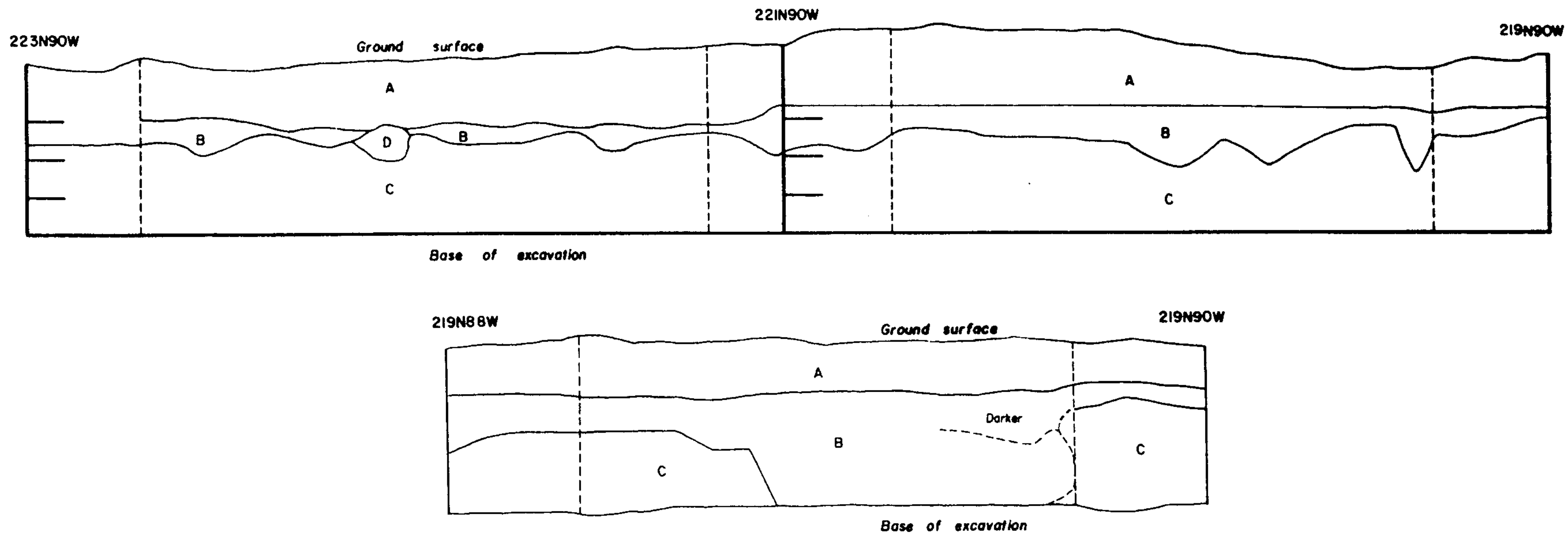


Figure 5.10. Profiles of excavation units, 23HI297, Locus II-East.

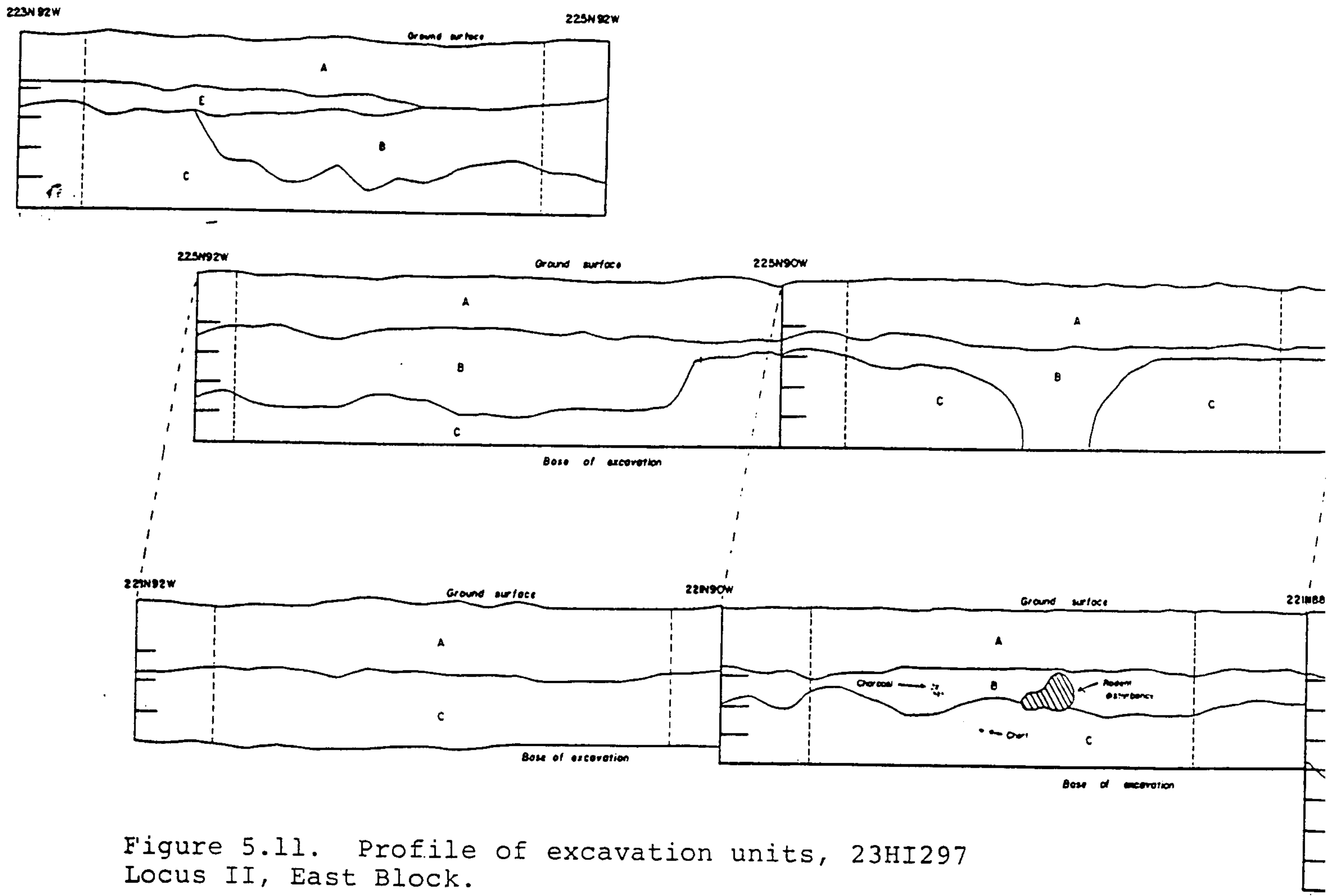
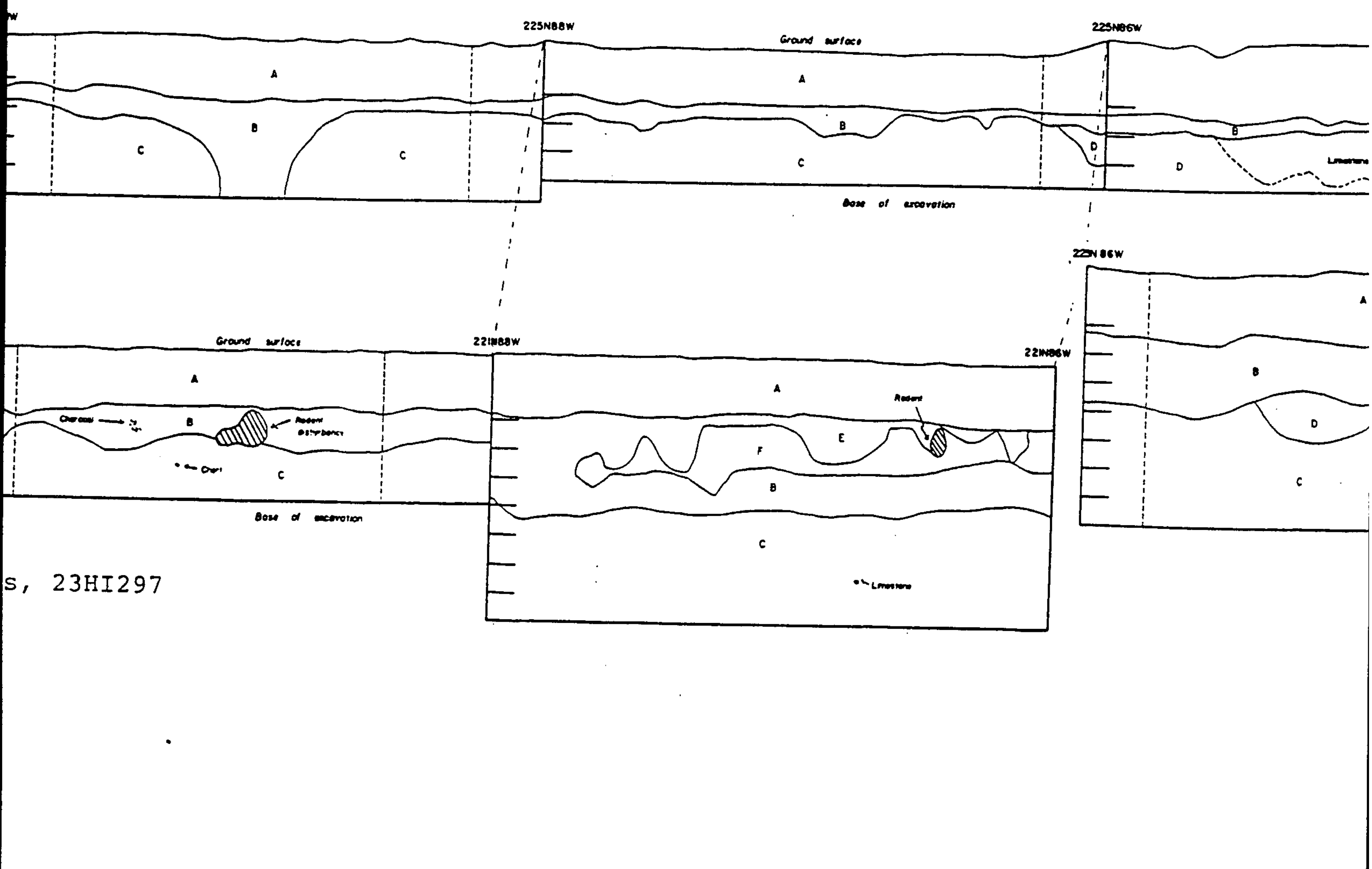


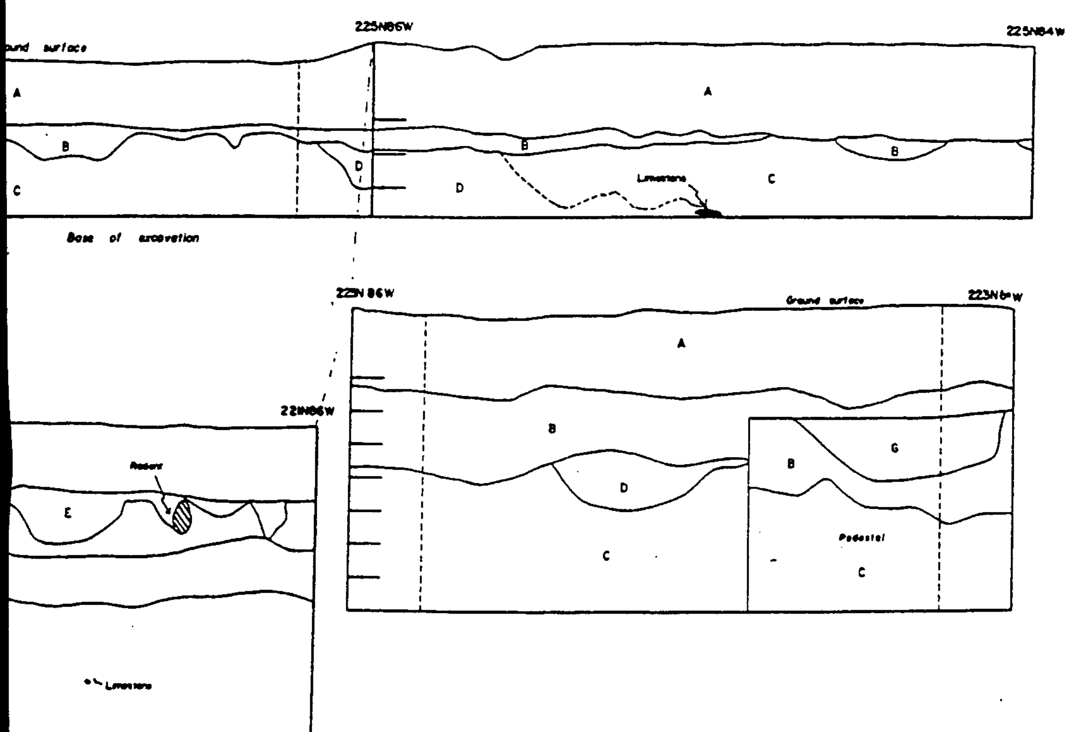
Figure 5.11. Profile of excavation units, 23HI297 Locus II, East Block.



s, 23HI297

2 of 3

585



225N86W
225N84W
und surface
A
B
C
D
Limestone
Base of excavation
223N 86W
Ground surface
223N8?W
221N86W
Rodent
E
G
Pedestal
Limestone

As can be seen from Figure 5.11, there were other soil features in the 221 and 223 N lines and in the 92 W line. The soil was difficult to distinguish from the Zone B soil and in many ways tended to grade into it. This may represent areas of intense cultural activity, or possibly recent root activity. Color was very dark greyish brown (10YR3/2). The soil area marked F was similar to E soil but had inclusions similar to those of Zone C, that is, 10YR3/2 with mottles of 10YR5/3 colored soil. The soil anomaly designated G was feature fill – dark loose soil that may represent the silting in of an open pit. This was dark grey in color (10YR4/1).

In the Locus II excavation area, the Zone B soil represented a culturally deposited midden that was either 10YR4/3 or 10YR4/2 in color, silty and fine textured. A comparison of the artifact densities in this soil with those of other areas will be provided in a later section. Several features appeared to originate in this zone, although possibly they had been in the plowzone as well.

Features

During the course of digging the Locus II east and west excavation blocks, a multitude of soil anomalies were discovered and investigated. The majority of these were identified as krotovinae or tree root discolorations. In most cases, these soil discolorations were not designated as features unless on-site investigations suggested that they might be culturally produced.

Some of the criteria for this determination included: the presence of charcoal, the absence of lateral tunnels after cross- and quarter-sectioning, the absence of orange staining around grayish discolorations (these usually turned out to be krotovinae) and the presence of symmetrical formations. Several post-molds were also found. The horizontal distribution of these features, as well as descriptions, are provided in a later section.

The Collections

CERAMICS

A total of 329 pottery sherds were recovered during the excavations at 23HI297. All of these were found within Locus II on the upper terrace: 219 in the west block, 105 in the east block and five in the excavation unit between those two blocks (Table E-5.1). Also there were sixty-one pieces of irregularly shaped clay from 221N/130W which are presumed to be daub. No tempering or impressions were seen in these lumps of fired clay.

LITHICS

Artifacts

Projectile Points

A total of 109 specimens which could be classified as projectile points were recovered during the manual and mechanical excavation of the Cross Timbers Site. Four of those were too fragmentary to determine their basic morphology and are thus placed within the unclassifiable, Category 999.

There is a large range of diversity of style represented in the projectile point sample from the site. As there are some assemblage differences in various areas of the site, the discussion of the projectile point sample is best divided into three sections: Locus I and Locus II, East and West. The assemblage in each area can be described and then compared with the others.

On the upper terrace in Locus II, the assemblage in the west block differs appreciably from that in the east block. The projectile points in the west block (Table 5.1) are diagnostic of both the latest and earliest occupations at the site. In the upper levels there are three Scallorn arrowpoints, two Fresno triangular arrows, six side-notched Reed arrowpoints, another unidentified arrow blade, a medium-sized side-notched dart (Category 321), and a small barbed, corner-notched dart (Category 315). All of the arrowpoints date to the Late Woodland period in this region. It is likely that the triangular Fresno points date into the Mississippian period, even as late as the contact period. The two dart points are unknown temporally but probably also date to either the Late Woodland or Mississippian period.

Also in the west block of Locus II, but at a much lower depth, between 97 and 110 cm, there were three projectile points (Table 5.1). One of these was an Etley (Category 339), which presumably dates to the Late Archaic period. One of the others was a bifurcate base dart (Category 374), similar to those from the southeastern United States which date to the Early Archaic period around 8,000 years B.P. While this point was only five centimeters below the Etley specimen in the same excavation unit, it is reasonable to believe that there is great antiquity to the bottom-most cultural material at the site. The third point came even below the bifurcate base specimen at 108 cm below the plowzone. This specimen is a very shallowly side-notched dart with a concave base and sharply pointed ears. The specimen is somewhat reminiscent of early lanceolate points, but with a slight constriction on the sides near the base. Given its context, it probably dates to the Early Archaic period.

TABLE 5.1

Projectile Point Types From West Block of Locus II

Plowzone	0-10 cm	10-20 cm
2 - 322 Scallorn 334 Fresno	321 Side-notched 322 Scallorn 4 - 323 Reed 334 Fresno	2 - 323 Reed

20-30 cm	30-90 cm	90-110 cm
333 Unclassified arrow 315 Barbed corner-notched	None	324 Shallow side-notched 339 Etley 374 Bifurcate base

A greater variety of point styles is present in the east block of Locus II (Table 5.2). Within the plowzone and 20 cm below, the inventory of points from the west block is duplicated with the exception of the Category 315 dart. However, several additional styles are found with the Fresno, Reed, and Scallorn arrows. They are primarily corner-notched dart forms, including Cooper-like points (Categories 310 and 311), small darts (Categories 302 and 303), Afton forms (Categories 307 and 316) and an Afton- Snyders-like Truman Broadbladed (Category 328). Within this upper component there is also a medium-sized side-notched dart (Category 321) and a contracting stemmed Standlee point (Category 332). With the possible exception of the Afton and Standlee specimens, all of the forms in this upper component date no earlier than the Woodland period.

Below approximately 20 cm beneath the plowzone there are many specimens typical of Late Archaic occupations in the Ozarks. This component appears to be nearly absent in the west block of Locus II. The projectile points in this assemblage include Etley (Categories 339 and 341), Smith (Category 326), Table Rock Stemmed (Category 342), Sedalia (Category 335), Stone Square Stemmed (Category 337), a straight-stemmed form (Category 336) and a side-notched type (Category 320). In addition to these typical Late Archaic forms, there were some types which had appeared in the upper component and a few forms which were previously unknown temporally. Standlee (Category 332), Cooper-like corner-notched (Categories 310 and 311), Truman Broadblades and small corner-notched darts with concave bases (Category 302) occur in both the upper and lower components in this east block of Locus II. In addition to these and the points which are well-known horizon markers of the Late Archaic period, there was a stubby dart with a square base (Category 366), a small corner-notched dart (Category 306) and a specimen which is categorized as a Snyders point (Category 317). The broad corner-notched point classified as Snyders actually is typologically late for the context in which it was found. It is possible that a form of point was in use at this period which resembles the Middle Woodland Snyders points but originated from a Williams and Cooper corner-notched tradition. These forms are often difficult to segregate morphologically.

Locus I on the lower terrace contained a projectile point inventory very similar to that in the east block of Locus II (Table 5.3). Only three points were recovered during the manual excavations in that area. A small dart with elliptical corner-notches (Category 309) was recovered from 15 cm below the plowzone. At 37 cm was a side-notched specimen (Category 321) and at 40 cm was a small dart point with rounded corner-notches and barbs. None of these points was typologically well-known, although a Category 321 point had been recovered from the upper component in Locus II.

TABLE 5.2

Projectile Point Types from East Block of Locus II

Plowzone

321 Side notched
310 Cooper
334 Fresno
2 - 303 Corner-notched
2 - 323 Reed
2 - 364 Unclassified corner-notched

0-10 cm

302 Concave based corner notched
311 Cooper
333 Unclassified arrow
323 Reed
325 Rice side-notched

10-20 cm

303 Corner-notched
2 - 307 Afton
316 Afton
322 Scallorn
323 Reed
328 Truman broadblade
332 Standlee

20-30 cm

306 Corner-notched
311 Cooper
326 Smith
320 Shallow side-notched
2 - 332 Standlee
336 Straight-stemmed
2 - 339 Etley
342 Table Rock Stemmed
366 Stubby square-based

30-40 cm

311 Cooper
2 - 328 Truman Broad-blade
335 Sedalia
336 Straight-stemmed
341 Etley

40-50 cm

302 Concave-based corner-notched
310 Cooper
317 Snyders
337 Stone Square Stemmed
342 Table Rock Stemmed

TABLE 5.3

Projectile Point Types from Locus I

Manual Excavations

Plowzone - None
0-10 cm - None
10-20 cm - 309 - Elliptical corner-notched
20-30 cm - None
30-40 cm - 321 Side-notched
315 Barbed corner-notched

Stripping - Plowzone

2 - 303 Small corner-notched
307 Afton
309 Elliptical corner-notched
312 Afton-like
316 Afton
321 Side-notched
322 Scallorn
324 Shallow side-notched
325 Rice Side-Notched
327 Truman Broadblade
2 - 328 Truman Broadblade
330 Gary
3 - 332 Standlee

Stripping - Interface

301 Side-notch, concave base
2 - 302 Corner-notch, concave base
304 Corner-notch, Scallorn-like
305 Corner-notched
3 - 307 Afton
309 Elliptical corner-notched
320 Side-notched-shallow
3 - 321 Side-notched
326 Smith
331 Unclassifiable contracting-stemmed
325 Rice Side-Notched
364 Unclassifiable corner-notched

The majority of the projectile points from Locus I were recovered during the mechanical scraping of the plowzone. From within the plowzone itself there was another Category 309 specimen and another side-notched Category 321 point, similar to those from Test Pit 2. Most of the other points from the plowzone were similar to those in the upper component in Locus II; there were Afton and Afton-like specimens (Categories 307, 312, and 316), two small corner-notched darts (Category 303), a Scallorn arrowpoint (Category 322), three Truman Broadblades (Categories 327 and 328), and three Standlee points (Category 332). Two of the other three points from the plowzone typologically date to the same Woodland period and include a Rice Side-Notched dart (Category 325) and a Gary contracting stemmed point (Category 330). The other point is similar to the side-notched specimen from the deepest component in Locus II. This Category 324 point resembles a Rice Side-Notched point in the shallowness of the notches but is also reminiscent of early lanceolate points.

The projectile point inventory from the contact zone between the plowzone and the intact cultural midden is similar to that in the plowzone and Test Pit 2. Three Category 321 side-notched darts and another Category 309 small elliptically notched dart were recovered. Points found within the Woodland component in other samples at the site found also on the interface include two small corner-notched darts (Category 302), three Aftons (Category 307), one Rice Side-Notched dart (Category 325), and a contracting-stemmed point which is either a Gary (Category 330) or a Standlee (Category 332). Two points – a side-notched dart (Category 320) and a basally-notched Smith point – resemble those found in the lower component of the east block of Locus II. Three small darts are unlike any others found in other areas of the site. One is a small side-notched form with a concave base (Category 301). The other two are corner-notched (Categories 304 and 305); one resembles a Scallorn point in overall morphology but is larger.

Scrapers

A total of 129 scrapers were recovered from 23HI297 during the manual and mechanical excavations (Table E-5.2). Of these, only four are bifacially worked. The other 125 specimens can be classified into seven morphological types; there were 13 convex, 9 concave, 30 straight, 2 notched, 23 irregular and 24 generalized scrapers, and 4 spokeshaves. Both end- and side-scrapers were represented.

Of the 125 unifacial scrapers, 44 were recovered during the mechanical stripping of Locus I. The distribution of the other 81 manually excavated specimens through various levels of the deposit is presented (Table E-5.3). There is a bimodal distribution of straight, generalized and irregular scrapers with the frequency peaking in the plowzone and 0-10 cm level

and then again at either the 30-40 cm level or the 40-50 cm level. A similar trend is seen with the concave scrapers. This bimodal distribution parallels the distribution of projectile points with a Woodland, or later, component in the first three levels and a Late Archaic assemblage below that. The distribution of notched scrapers and those with spokeshaves is difficult to assess because they occur infrequently. The unimodal distribution of the convex scrapers is apparently real, however, and probably indicates either a functional or stylistic change during the later period.

Bifaces

In addition to the projectile points and bifacially flaked scrapers described above, a variety of bifacial chert tools were recovered. In all, 219 specimens were placed in the general biface category (Table E-5.2). Of these the majority (200) were too fragmentary to be placed in a morphological subtype. The remaining nineteen bifaces complete enough for their shape to be determined were placed in six morphological classes: four were ovate, one was triangular, six were acuminate, one was circular, three were rectangular, and four were of a generalized shape. Given the small number of bifaces which could be classified morphologically, vertical or horizontal distribution patterns would be relatively meaningless.

Other Chipped Stone Tools

A variety of other tools from 23HI297 were manufactured from chert (Table E-5.2). Neither the diversity or frequency of these other tools is as great as at some of the sites in the reservoir area, particularly the Cootie Site, 23BE676 (Chapter 4). Some tools found at 23HI297 were, however, rather infrequent occurrences at other sites.

In addition to the numerous cutting implements categorized as bifaces, there were at least three other forms of cutting tools; there were five knives, a flake blade, and a denticulate. Of these, only one knife was found in Locus I. The rest came from the western portion of Locus II.

Pointed implements, probably for engraving and drilling, were fairly numerous. There were fourteen gravers, three perforators and a single drill. There were no burins recovered at 23HI297. All of these pointed implements were found in Locus II primarily in the eastern block.

Two other types of well-made chert tools were recovered from the Cross Timbers Site, all from Locus I. There were three cleavers and a hoe. The hoe, with its broad blade and rounded distal end exhibiting a glossy sheen, is a very unusual occurrence within the project area.

In addition to these finished forms, three other types of specimens were recovered which represent earlier stages of lithic tool manufacture. A variety of cores and core fragments were recovered; there were 68 from Locus II and 13 from Locus I. Additionally, within Locus I there were two blanks and a preform.

Ground, Pecked and Modified Stone

More than seventeen pieces of stone were recovered which have been modified in some way by human activity other than chipping (Table E-5.2). Four specimens are classified as hammerstones; they are pieces of chert which have been rounded by battering on at least one side. One was from Locus I and the others from the east block of Locus II. Another naturally rounded cobble, this one from the west block of Locus II, shows evidence of having been used for grinding, and is classified as a mano. Two other milling stones with depressions on one side are classified as metates and came from Locus I. Eight additional pieces of limestone and igneous rock exhibit various degrees of smoothing or pitting and are presumed to be fragments of plant processing tools.

Two other forms of modified stone are present at 23HI297. Two pieces of sandstone have a groove on one side and are classified as abraders, probably used as shaft straighteners. Additionally, several pieces of fire-cracked rock were found throughout the midden. These included sandstone, limestone, chert and a few igneous pieces.

Historic Artifacts

The only evidence of relatively recent activity at 23HI297, aside from modern plowing, roads, fences, etc., was a single piece of glass from the plowzone in the east block of Locus II. The glass was unmodified, clear and further unidentifiable.

Debitage

This discussion will be primarily focused on chert debris, which formed the majority of the lithic material that was recovered. The locations, numbers and types of debris are presented in Table E-5.4, which is subdivided into the various excavation areas.

In Locus I, two test pits were dug and surface and subsurface collections were made. Total chert debris from the test pits was 1,127 pieces; there were 501 pieces of miscellaneous rock, which included sandstone, limestone, and fire-broken rock. Of the chert, 671 pieces or 59.5% of the total were flakes or flake fragments. Unmodified complete flakes comprised 12.8% of the flake category, and modified complete

flakes (either utilized or retouched) were 3.7%; this figure includes trim flakes. In both the unmodified and modified flakes category, tertiary flakes were most numerous; they comprised 80% and 100% of their respective categories. Chunks of raw material comprised a very small proportion of the chert – only .2%.

Other Locus I material came from the features uncovered by the removal of the plowzone and from general collections. Feature 2 had proportionately fewer flakes and flake fragments than the test units and other features – only 35% of the total chert (39 pieces out of 110). There was also a greater amount of shatter – 59% of the sample. Unmodified tertiary flakes represented 21% of the flakes and flake fragments.

Feature 3 had a total of 558 pieces of chert, of which 357 (64%) were flakes and flake fragments. Only 57 of the flakes were whole, and the majority of these (81%) were tertiary flakes. This feature included 372 pieces of miscellaneous rock, or 40% of all the lithic debris at Locus I.

Feature 4 had very little chert – five flake fragments and two pieces of shatter.

Other material from Locus I came from unsystematic collections, and as such do not provide very good information about proportions of lithic material. Altogether the total number of flakes and flake fragments found in Locus I, including trim flakes, was 1,099. This represented 60% of the chert debris recovered from Locus I of the intact flakes, 21% (42 of 198) were modified in some manner, either through use or deliberate retouching. Flake fragments were 81% of the total flake count.

Locus II provided the largest sample of lithic debris from the site, a total of 27,514 pieces of chert (Table 5.7). Of this, 74.8% came from the eastern excavation block, 22.6% from the western excavation block, and 2.6% from the 2 x 2 meter unit (Test Pit 8) midway between the two excavation areas. For some of the units, the debris density in the plowzone is not comparable since in many instances this level was not screened. All material observed during the removal of the plowzone was picked out, but no effort was made to obtain even a representative sample.

In the eastern excavation block of Locus II, flakes comprise the largest category – 12,603 or 61.4% of all the chert. Most of these were flake fragments and included 10,551 pieces or 83.7% of the total. Of the 1,391 complete flakes, 1,064 (76.5%) were unmodified. Of these unmodified flakes, the great majority – 928 (87.2%) – were tertiary flakes, 9.7% were secondary flakes, and 3.1% were cortex or primary flakes. Of the 327 modified flakes, only 5 (1.5%) were primary flakes;

43 (13.1%) were secondary flakes; and 279 (85.3%) were tertiary flakes. Trim flakes, those removed from an already retouched artifact, totaled 661 or 5.2% of the flakes. The rest of the chert debris found in the eastern excavation block was shatter, chunks and raw material and numbered 7,977 pieces or 38.8% of all the chert.

Material from Test Pit 8, between the east and west blocks, was mostly flakes: 485 of 728 pieces of chert or 66.6%. Only 46 of these (9.5%) were complete flakes. Thirteen of these were modified flakes, none of which were primary flakes; one was a secondary flake and the remainder were tertiary flakes. There was one trim flake. Of the remaining intact flakes, 5 (11.1%) were primary, 12 (26.6%) were secondary, and 15 (33.3%) were tertiary. The rest of the chert debitage was shatter (23.4%) and chunks (10%). Miscellaneous rock, much of which came from Feature 10, was 21.7% of all the debitage from this unit.

Within the four 2 x 2 meter units in the west block of Locus II there were 3,732 flakes with flake fragments accounting for 77.8% of the total flake assemblage. Of the remaining intact flakes, 476 (57.5%) were unmodified, 177 (21.4%) were modified, and 175 (21.1%) were trim flakes. Both the modified and unmodified flakes had a majority of tertiary forms, 79.1% and 85.7% respectively. Primary flakes accounted for 1.6% of the modified flake category and secondary for 19.2%. Of the unmodified flakes, 18 (3.8%) were primary and 50 (10.5%) were secondary. Shatter was 34.5% of the total chert; chunks were 5.1%, and raw material .2%. The miscellaneous rock category was 13.1% of the debris.

BOTANICAL REMAINS

Thirty-nine botanical samples from 23HI297 were submitted to Frances B. King of the Illinois State Museum for identification. These were taken from excavated units and features in the two loci; the majority (36) came from Locus II (Table E-5.5). Of the six samples from Locus I, one was identified as calcined shale, one as wood charcoal, one as ash charcoal, two as hickory nuts, and one as oak (Ulmaceae) charcoal.

The samples from Locus II were even more diverse. Of the fourteen wood charcoal samples, seven were identified as hickory, three as oak, one as walnut, one as ash, and two as black locust. The range in weight for these samples was from .1 gram to 8 grams. Charred nut husks were of hickory, walnut and hazelnut.

The only generalization that can be made on the basis of these samples is that a wide variety of wood species was being utilized. All of these are currently found in the area of the site.

FAUNAL REMAINS

No identifiable faunal remains were recovered from 23HI297 due to extremely poor preservation.

Dating

A large series of samples was submitted to Dr. R. M. Rowlett at the University of Missouri-Columbia for thermoluminescence dating determinations and to Dicarb Radioisotope Company for radiocarbon dating. Because charcoal preservation was poor, only a few samples large enough for carbon dating could be obtained. Therefore, the thermoluminescence series is far more representative of the horizontal and vertical range of deposits. In only a few cases was it possible to compare the thermoluminescence results to the C-14 results. The results are presented briefly and are interpreted here. For more detail on the dating process and laboratory interpretation see Vol. I, Appendix B.

LOCUS I

Thermoluminescence

23HI297-1
Provenience: 73N/82W, 10-20 cm
Date: A.D. 483 ± 144

23HI297-2
Provenience: Feature 2
Date: None (sample material not sufficiently heated)

23HI297-3
Provenience: Feature 3
Date: A.D. 397 ± 152

Radiocarbon

23HI297-3166 DIC-1917
Provenience: Feature 2
Date: 2310 B.P. ± 100 (360 B.C.)

23HI297-3177 DIC-1918
Provenience: Feature 4
Date: 2730 B.P. ± 60 (780 B.C.)

DISCUSSION

Prior to the results of chronometric dating, the cultural sequence within Locus I was somewhat ambiguous. Based on the few projectile points recovered from Test Pit 2, with comparisons to the stratigraphic sequence of projectile points in Locus II, it appeared that a single component was represented. Although none of the three projectile points was a temporally

known type, two Category 321 points had occurred in the upper deposits in Locus II. In Test Pit 2, a Category 321 point was recovered between 30 and 40 cm, and it was assumed that all deposits above this level dated to the Woodland period. The appearance of some Late Archaic points during the mechanical stripping of the plowzone was somewhat unexpected. In particular, the several Afton points and a Smith point indicated that the surface which had been exposed represented occupation during at least two periods.

It appears from the dates obtained from Locus I that this area was in use fairly early in the Woodland period from between 840 B.C. to 260 B.C. The typically Late Archaic period styles of projectiles may represent cultural continuity with use into the early part of the Woodland period. The two thermoluminescence dates probably represent a second occupation in this area, sometime between A.D. 245 and A.D. 627. The majority of the lithic assemblage most likely dates to this Middle to Late Woodland period. Many of the projectile point styles from Locus I are typical of the Late Woodland period in the Ozarks. Unfortunately, the large range of dates obtained from a single surface in Locus I indicates that there has been a good deal of mixing of both lithic assemblages and features from more than one occupation.

LOCUS II - WEST

Thermoluminescence

23HI297-4
Provenience: 221N/130W, 0-10 cm
Date: A.D. 911 ± 103

23HI297-19
Provenience: 221N/130W, 10-20 cm
Date: A.D. 950 ± 100

23HI297-20
Provenience: 221N/130W, 20-30 cm
Date: A.D. 600 ± 150

23HI297-10
Provenience: Feature 11 in 221N/130W, 0-10 cm
Date: A.D. 1317 ± 64

DISCUSSION:

There were no samples of charcoal large enough for radiocarbon dating, nor were any datable samples obtained from the deepest component in this area. The series of four thermoluminescence dates nicely confirms a sequence of occupation in this part of the site which is apparent from the projectile point distributions. It appears that the assemblage within the first 20 cm below the plowzone is from the Late Woodland

period, sometime between A.D. 808 and A.D. 1050, probably around A.D. 930. The majority of the projectile points, including Scallorn and Reed arrowpoints are typical of this period.

There is evidence, in the form of Fresno triangular arrows, that the site was occupied after the Woodland period. The date of A.D. 1317±64 would indicate an occupation during the Mississippian period. It appears that most of this latest component has been destroyed by plowing. The one date from this occupation came from a pit feature which intruded into the lower Woodland assemblage but probably originated within the plowzone.

Below the Late Woodland component, in deposits which contained a somewhat different projectile point assemblage, came the date of A.D. 600±150. This may indicate that this portion of the site was occupied still earlier in the Late Woodland period, perhaps before the adoption of the bow and arrow. Considering the standard deviations of dates from the site, the occupation here may have overlapped with the latest Woodland component in Locus I.

LOCUS II - EAST

Thermoluminescence

23HI297-6
Provenience: 219N/90W, 0-10 cm
Date: 3548 ± 301 B.P. (1598 B.C.)

23HI297-12
Provenience: 221N/88W, 0-10 cm
Date: A.D. 125 ± 500

23HI297-13
Provenience: 221N/86W, 10-20 cm
Date: A.D. 200 ± 175

23HI297-16a
Provenience: 221N/88W, 10-20 cm
Date: 2590 ± 300 B.P. (640 B.C.)

23HI297-16b
Provenience: 221N/88W, 10-20 cm
Date: A.D. 342 ± 130

23HI297-9
Provenience: 221N/92W, 10-20 cm
Date: None (sample material probably not sufficiently heated)

23HI297-14
Provenience: 221N/86W, 20-30 cm
Date: 2375 ± 250 B.P. (425 B.C.)

23HI297-15
Provenience: 221N/88W, 20-30 cm
Date: A.D. 20 ± 200

23HI297-17
Provenience: 223N/92W, 30-40 cm
Date: A.D. 600 ± 110

23HI297-8
Provenience: 223N/92W, 33 cm
Date: A.D. 236 ± 167

23HI297-11
Provenience: 223N/92W, 42 cm
Date: 2899 ± 266 B.P. (949 B.C.)

23HI297-18
Provenience: 221N/88W, 40-50 cm
Date: 5950 ± 440 B.P. (4000 B.C.)

Radiocarbon

23HI297-3112 DIC-1919
Provenience: 221N/88W, 60-70 cm
Date: Too small

23HI297-3183 DIC-1920
Provenience: 219N/90W, 0-10 cm
Date: Modern

DISCUSSION

Two of the Thermoluminescence dates (#6 and #9) were impossibly early, either due to exposure to light or having not been heated to 400° C in antiquity. Neither of the radiocarbon samples were useful; one was too small to run and the other resulted in a modern date.

The remaining ten thermoluminescence dates are useful for outlining the chronology of occupation in this Locus and also for demonstrating the problems of developing culture chronologies in open sites in the Ozarks. A comparison of the stratigraphic occurrence of the projectile points from the east block of Locus II with the thermoluminescence dates from various levels (Fig. 5.12) elucidates two trends that are recurrent in the project area sites. First, there appears to be physical mixing of deposits from different occupations. Second, there appears to be continuity of projectile point styles from one period to the next.

There seem to be four periods represented by both the dates and the projectile point sequence in this locus. The latest of these is represented by HI297-17 (A.D. 600±110), which was a sample from 30-40 cm but was within fill from a

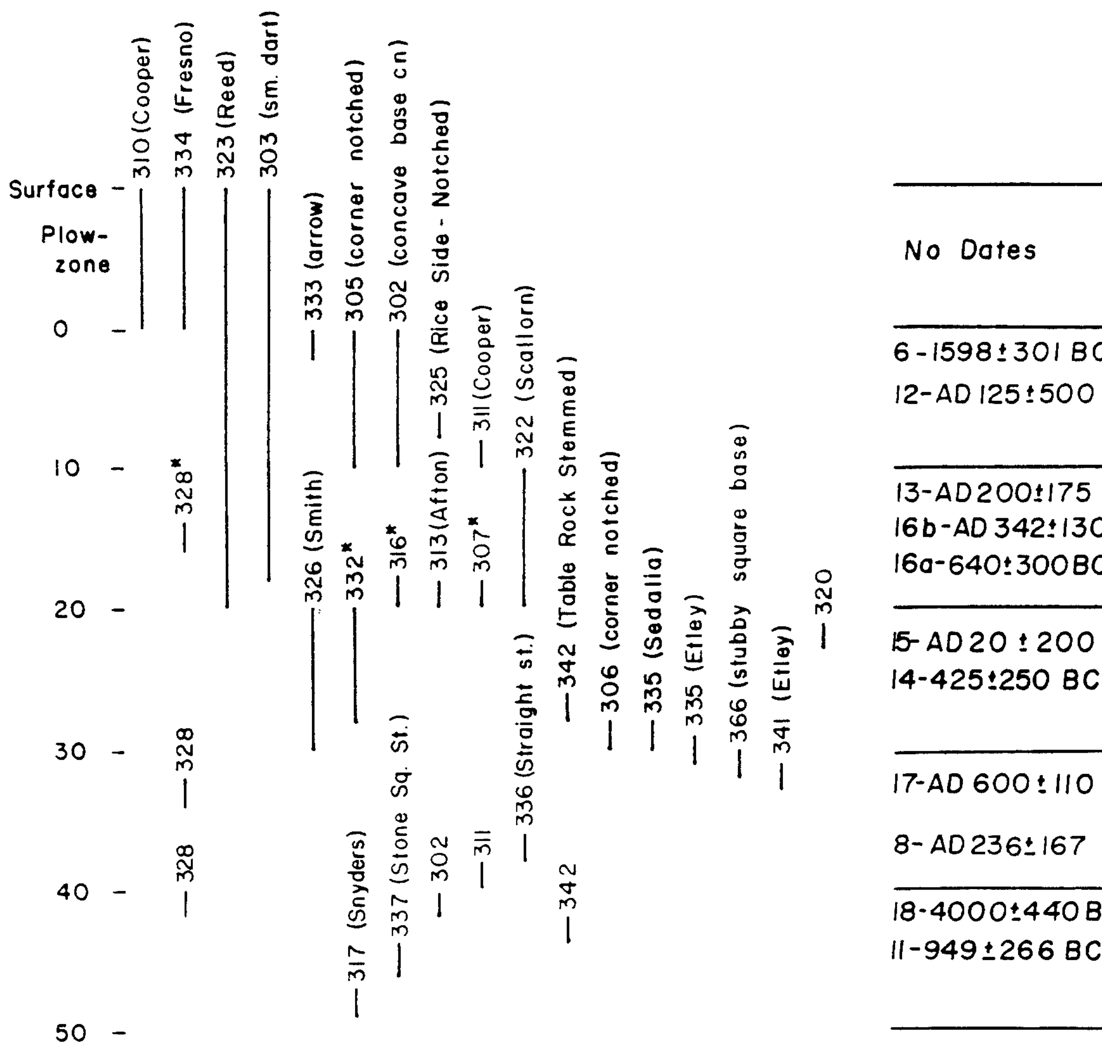


Figure 5.12. Projectile point and thermoluminescence dates sequence in East Block of Locus II.

housepit. No other reasonable dates were obtained from this component which was in the plowzone and from 0 cm to approximately 18 cm below the plowzone and contained typical Late Woodland projectile forms. This date compares favorably to the date from the middle component in the west block of Locus II.

The second set of dates is somewhat difficult to interpret. With a few exceptions, thermoluminescence samples were chosen from general excavation levels in the lithics laboratory. Thus, the vertical control on these specimens is only to the closest 10 cm. The projectile point sequence which we are trying to date is, however, better controlled; most were piece-plotted. Within the 0 to 10 cm and 10 to 20 cm levels there were vertical clusters of points typical of different traditions. The thermoluminescence samples, taken from each of these general levels, may then be from one of two possible components.

Below the Late Woodland assemblage, but slightly above a Late Archaic assemblage (including Etley, Sedalia, Smith and Table Rock Stemmed), were several Afton points. Dates that can probably be assigned to this component are numbers 12, 13 and 16b which resulted in dates of A.D. 125±500, A.D. 200±175 and A.D. 342±130, respectively. Sample #12 is somewhat unreliable in its present form and could alternatively date the Late Woodland component. If the second two dates are reliable, this would place the Afton form somewhat later than previously expected and may indicate cultural continuity of point styles. A date of A.D. 236±167 (sample #8) run on a Truman Broadblade falls within this cluster of dates. This specimen was on the surface of the base of a possible house pit and may date the use period of that feature.

Three other dates form a somewhat earlier cluster and probably date what stylistically appears to be a Late Archaic component. Samples 14, 16a, and 11 gave results of 425±250 B.C., 640±300 B.C., and 949±266 B.C., respectively. These represent a relatively long time span and may indicate that the site was occupied periodically. All of the projectile points within this stratum are typically Late Archaic. These dates indicate that there was a high degree of cultural lag, with forms such as Etley, Sedalia, Table Rock Stemmed and Smith being used into the Early Woodland time period.

A fourth date (sample 15) of A.D. 20±200 falls between this cluster of dates and the cluster assigned to the Afton component. This date supports the argument that the site was occupied recurrently. Similarly, a date from a rock feature in 221N/115W, midway between the west and east blocks of Locus II, of A.D. 1±168 indicates that there was occupation during the Middle Woodland time period.

There is a large gap between the dates from the Late Archaic assemblage and the deepest and oldest sample from this locus of the site. Sample #18 yielded a date of 4000±440 B.C., which is difficult to assess. It came from the 40-50 cm level, the top of which yielded a date 3000 years younger. This 4000 B.C. date may accurately date a Stone Square Stem point (Category 337) from the unit, albeit an early date for this style. It is reasonable to assume that the site was occupied at such an early date; a bifurcate based point (Category 374) was found deep in the west block, suggesting occupation as early as the Early Archaic period.

Intra-Site Comparisons

VERTICAL

It can be seen from the projectile point distributions (Tables 5.1, 5.2, 5.3), debris distributions (Table E-5.4), and the radiometric dating determinations that the vertical patterning within each excavated locus of 23HI297 is different.

The patterning in the lower part of the site, Locus I, is difficult to discern. Of the two manually excavated units there, only one contained enough cultural material for distribution recognition. On the basis of debris and tool distribution, it appears that two components may be represented. These are not well segregated vertically, and this determination is partially made on the basis of thermoluminescence and radiocarbon dates which fall into two ranges. The projectile point sample recovered during mechanical stripping suggested also that two components were present in Locus I. The fact that materials from more than one time period were lying just below the plowzone indicates that there is little stratigraphic separation of the two components.

Vertical segregation of materials from different occupations is best within the west block of Locus II, but once again, is not complete. Thermoluminescence dates and changing projectile point inventories in different levels of excavation indicate that there were probably four periods of occupation in this locality. The latest, probably around A.D. 1300, is primarily within the plowzone. A Woodland occupation, probably around A.D. 930, is within the upper two levels below the plowzone. Perhaps 300 years earlier another occupation occurred. The remains of this occupation are found below 20 cm below the plowzone. Much deeper, around 100 cm below the plowzone, there is evidence of a Middle or Early Archaic occupation. While the dates and projectile points clearly indicate a sequence of occupation at different periods, the components are not fully segregated. There is a unimodal distribution of debris (Table E-5.4), with the majority of the material probably attributable to the latest Woodland occupation. There are no sterile zones between components, not even at the lowest depths. The presence of a Late Archaic Etley specimen

just above the early bifurcate base point indicates that there may have been a fifth component within the deposits. Components are not clearly distinguishable though, perhaps due to slow rates of terrace aggradation, fairly continuous occupation or pedoturbation.

The vertical distribution of materials in the east block of Locus II is the most complicated of the three loci at the site. It appears that this area was most intensively used and probably during more time periods. Evidence from projectile point types and radiometric dates indicate that this area may have been occupied as late as the latest component in the west block, A.D. 1300, and as early as 4000 B.C. There were four clusters of dates obtained from this area, and the upper deposits probably represent occupations even later than those which were radiometrically dated. Some vertical clustering of projectile points is also seen (Fig. 5.12). However, the occurrence of pit features within the Woodland component has greatly disturbed the stratigraphic separation of components. The debris appears to be bimodally distributed (Table E-5.4) with high frequencies in the plowzone and again between 20 and 50 cm below the plowzone. It is impossible to interpret this distribution because of apparent mixing of assemblages.

HORIZONTAL

The differences between the three major loci at 23HI297, in terms of periods of occupation, have been discussed throughout various sections above. It appears that the latest and earliest occupation may have been confined to Locus II on the upper terrace. All three areas were occupied during the Woodland period, perhaps simultaneously. Late Archaic forms which have been dated here to the Woodland period occur primarily in the east block of Locus II but appear in lower frequency in Locus I. Also in the east block of Locus II, there is evidence of occupation around 4000 B.C. and then again between approximately 1000 B.C. and 500 B.C. The deepest material in the west block may even pre-date this.

Within each of the loci of investigation features were discovered. No meaningful pattern of distribution of these features was apparent, with the exception of clusters of post molds in the east block of Locus II. The features are briefly described here.

Locus I - Manual Excavation

Feature 1 was a circular area of burnt earth, charcoal and some lithic debris that was first observed in level 01 in Unit 73N/82W. The soil discoloration was very diffuse and amorphous in the upper levels where pedoturbation had obscured the margins, but it was somewhat more evident in levels 03 and 04. In cross section, Feature 1 was conically shaped and went

to a depth of 71 cm below the base of the plowzone. This feature is probably associated with the occupation dated to approximately A.D. 480.

Locus I - Mechanical Stripping (Fig. 5.13)

Feature 2 was uncovered by the mechanical removal of the plowzone. It was an area of firebroken rock and other lithic debris located at 70.20N/91.70W. Artifacts found in association with this area included two projectile points (Categories 301 and 321), a biface fragment, a piece of groundstone, an abrader and the single hoe found at the site.

Both a C-14 sample and a sample for thermoluminescence dating were taken. The results were ambiguous. The C-14 technique gave a date of 2310 B.P.±100 years and was considered reliable in that it was of sufficient size to yield good results. The thermoluminescence process, done on a chert sample by Dr. Rowlett of the University of Missouri produced a date too old to be possible, and it was concluded that the chert had not been sufficiently heat-treated prehistorically.

Feature 3 was a concentration of lithic debris including flakes, cores, bifaces and a projectile point base, in association with an area of burnt earth and charcoal. Scattered throughout the area of the feature were burnt hickory nut husks. Although as many of these as possible were gathered for a C-14 sample, it was considered too small to give a reliable date.

A small, circular soil discoloration, 15 cm in diameter, was located just to the north of the lithic debris concentration. This feature, which was not given a separate number, included burnt earth, charcoal, and small flakes in its matrix. In cross-section, it was 9 cm deep, with walls constricting to a rounded base. This was possibly the remains of a burnt post or small hearth. Associated with Feature 3 was a small corner-notched dart which appeared to have been heat-treated. This was subsequently submitted for thermoluminescence dating. The result, a date of A.D. 397±152, fits in well with other material found in the same stratigraphic context.

Feature 4 was a large shallow basin of burnt earth, charcoal, and charred nut husks. Horizontally, it was roughly oblong, 125 cm in length along a north-south axis and 85 cm wide along an east-west axis. Maximum depth was approximately 20 cm. Several flakes were found within the feature, but there was no firebroken rock.

The charcoal and burnt nut husks were most dense in the southwest area of the feature, although there was a fairly good scatter throughout. A C-14 sample was submitted and resulted in a date of 2730 B.P.±60.

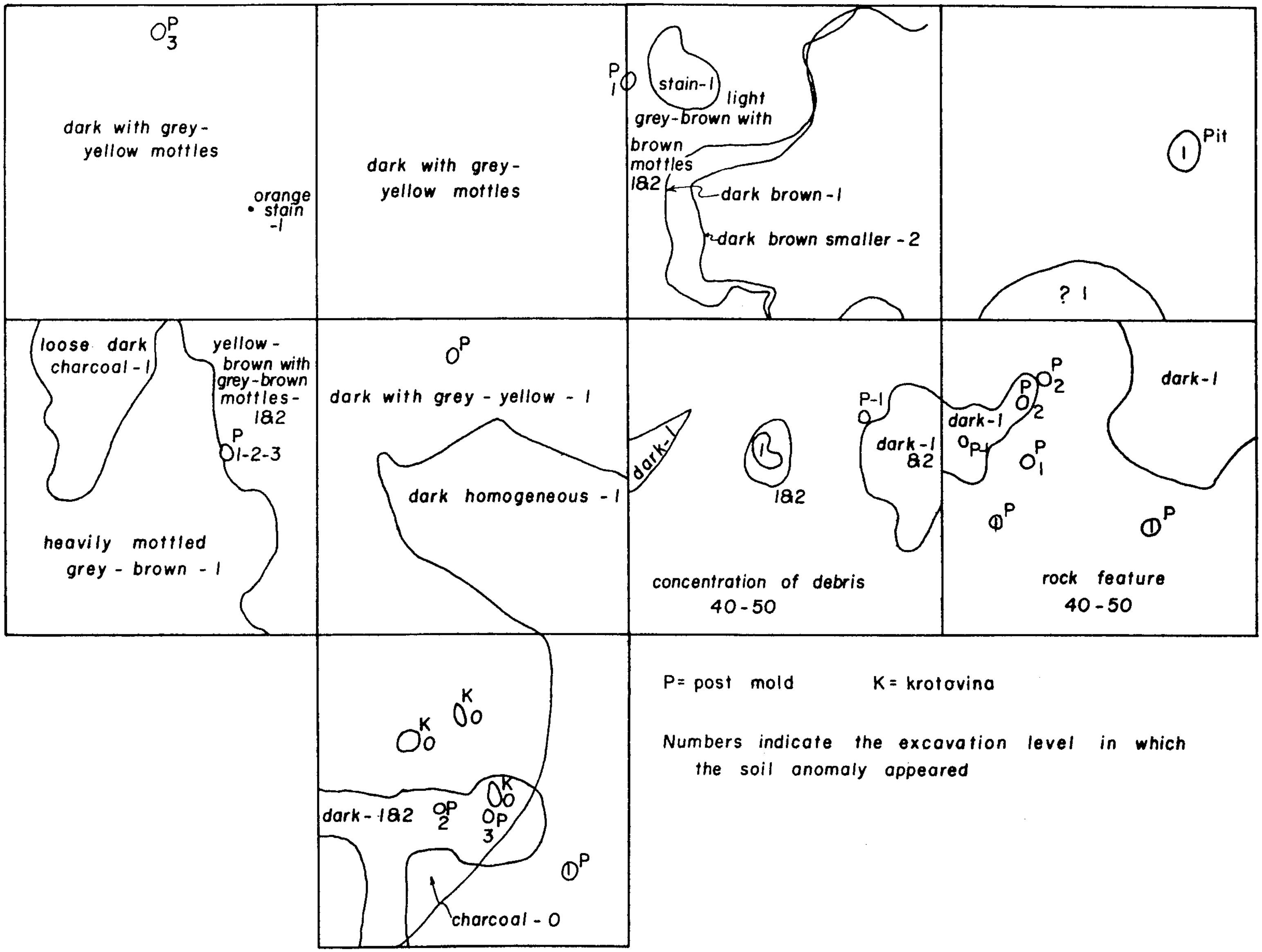


Figure 5.13. Distribution of post molds and soil anomalies in the East Block of Locus II.

Feature 5 was a small, oval soil discoloration with flecks of charcoal throughout its matrix. The soil was grittier and greyer than the surrounding area. Its horizontal dimensions were 13 cm long and 10 cm wide; in profile it had slightly constricted walls ending in a rounded base at a depth of 7.5 cm from the scraped surface. It was determined that this was probably a post-mold. Not enough charcoal was present to permit radiocarbon dating.

Feature 6 was an amorphous, poorly defined discolored area of burnt clay and charcoal. The matrix was gray, with a gritty texture in roughly the top half of the feature; the lower portion was less compact and lighter in color. The scraped horizontal surface appeared vaguely circular, about 30 cm in diameter. Cross-sectioning showed a total depth of 58 cm.

It is possible that the lower half of the feature was disturbed by rodent activity, although no sign of lateral rodent runs was seen. It is difficult to provide a functional interpretation of this feature, but the most reasonable possibility is that it was a pit or hearth, originally shallow, and that rodent activity has carried some of the fill deeper.

Feature 7 was a very large post-mold, possibly historic. The top showed a diameter of 26 cm, and in cross-section the walls were vertical and went to a depth of 64 cm below the scraped surface. The feature soil was finely textured, light grayish-brown, with a great deal of ash and charcoal present. No cultural material was found within the feature.

Feature 8 was a small post-mold; the top had probably been clipped off by plowing. It was 8.5 cm in diameter and 7 cm deep, conical in profile, and included many small flecks of charcoal within its matrix.

Feature 9 was similar in nature to Feature 7 — a large dark stain with ash and charcoal inclusions. The top was mottled and amorphous, but the profile showed clearly defined vertical walls ending in a square base at 57 cm below the scraped surface. The lower part of the feature was very loose and may indicate some rodent disturbance.

Locus II - Test Pit 8

Feature 10 was a concentration of fire-broken rocks in the north half of Unit 221N/115W, which was a 2 x 2 meter unit located roughly midway between the eastern and western excavation blocks. The rocks appeared at a depth of 10 cm below the base of the plowzone and continued through level 03 (to 30 cm below the base of the plowzone). There was no charcoal or burnt earth in the soil matrix surrounding the rock concentration and very little artifactual material. A

thermoluminescence date from this feature gave a result of A.D. 1±168, thereby associating it with a Middle Woodland occupation represented by a component immediately above Late Archaic forms in the east block.

Locus II - West Block

Feature 11 was located in the western excavation block in Unit 221N/130W. It appeared as a semicircle of darker soil; it was bisected by the southern wall of the unit. It was 45 cm wide along the east-west axis where the 221N line ran and was 28 cm along a north-south axis. It was quarter-sectioned north-south and in profile was 9 cm deep. There was an upper zone of dark brown soil with flecks of charcoal, which had a maximum depth of 7 cm. Below this was grey soil that may have been a result of rodent disturbance, or possibly an ash lens. Altogether this had the appearance of a shallow basin-shaped pit. This feature was dated by thermoluminescence to A.D. 1317±64, making it from the latest occupation at the site.

Locus II - East

Feature 12 was an area of fire-broken rock and chert debitage in Unit 221N/86W, in the eastern excavation block. These first appeared at 42 cm below the base of the plowzone and continued to a maximum depth of 50 cm. Thirty-nine pieces of fire-broken rock, cores, flakes, shatter, and projectile points were mapped in. The average depth of the material was 46 cm. The maximum horizontal range of the scatter was 180 cm along a northeast-southwest axis, with most of the feature in roughly the west half of the 2 x 2 meter unit. There were two biface fragments associated with the feature, as well as two projectile points (Categories 302 and 337). A small amount of charcoal was present, but there was no soil differentiation in the vicinity of the feature.

Post Molds

In an adjacent unit, 221N/88W, several areas of dark loose fine soil appeared in the 0-10 cm level. Two of these were irregular in outline; cross-sectioning them did not prove illuminating. Another round stain was cross-sectioned and quarter-sectioned and appeared to be a post-mold, with a horizontal diameter of 7 cm and a depth (from the top where it was first noticed) of 5 cm. This was given Feature Number 13.

Although they were not assigned feature numbers, there were other post-molds identified in the east excavation block. Several other soil anomalies may also have been remains of posts, but they were highly disturbed by rodents, and may in fact, have been filled rodent burrows. The dimensions of those anomalies which were definitely post molds are given (Table E-5.6).

The distribution of post-molds and possible post-molds is shown in relation to various soil texture and color zones observed during excavation in the east block (Fig. 5.13). It is seen that as well as a cluster of post-molds in the southeast portion of the block, there is a large area of dark brown soil in the northeast. The profiles of these units (Fig. 5.11) show a large band of complex soil changes. It is apparent that some type of intensive activity occurred in this area. It is possible that some sort of structure had been excavated and erected in this location, but the patterning is only suggestive of this. Similarly, in the northwest corner of the block, there is an area where the soil was a mixture of silty soil with predominantly dark brown soil with yellow and grey mottles. Evidence from the profiles of these units (Fig. 5.11) shows that this was a fairly deep and large pit which had filled with a homogeneous soil. A Truman Broadblade from the base of this pit was dated to A.D. 236±167, suggesting the period of use of this feature. Another date from the fill in this pit was A.D. 600±110.

Conclusions and Recommendations

The history of occupation at the Cross Timbers Site, 23HI297, is extremely complex. Occupation there may have been as early as the Early Archaic period. The site was used at least until sometime around A.D. 1300 during the Mississippian period. The focus of activity appears to have changed loci during different periods of occupation.

It is difficult to assess the function of the site during any given period because of the complexity of the stratigraphy and the small sample obtained. Most of the latest occupation is represented by material within the plowzone. Only one test unit cross-cut the earliest material at the site.

It is possible to make a few generalizations about the later occupations of the site based on the debris and tools recovered from the upper levels. There is a fairly high density of debris in the top levels of Locus II and in the middle levels of the east block. From this density it is apparent that lithic manufacture was a major activity at the site. All stages of manufacture are present. Initial stages are represented by raw material, cores, and primary flakes, as well as hammerstones and shatter. Intermediate stages are apparent, at least in Locus I, by the presence of preforms and blanks. The largest percentage of the debitage is in the form of broken and complete, but unmodified flakes, indicating final stages of tool production. Approximately 80% of these flakes were tertiary forms. Also present throughout the deposits are thinning flakes, indicating that tool maintenance occurred at the site.

The tool inventory is quite variable and indicates that several kinds of activities occurred at 23HI297. Scrapers and bifaces consitute the largest percentage of the well-made tools at the site. These are indicators of hunting and butchering activities, as well as plant processing. The preparation of vegetal materials is also evidenced by metates, a mano, and several other pieces of groundstone. Food preparation is also indicated by hearth features and an abundance of fire-altered rock. A variety of plant species was used, both for wood and for nuts. The presence of a hoe may indicate that some horticulture was practiced, but no direct remains were preserved. Alternately, the polish on the hoe specimen may have been achieved through digging for some reason other than horticulture. A large number of drills, gravers, and perforators indicate that engraving and perhaps leather-working occurred. The abrader may have been used as a shaft straightener during the later periods, after the adoption of the bow and arrow.

The amount of cultural material at the site, as well as the number of features, possibility of the presence of structures, and the degree of earth disturbance indicate that at least parts of the occupation were fairly permanent. The lack of stratification, the mixture of projectile point styles, and the variability in the dates suggest that occupation was fairly recurrent for a long period of time. It is possible that the site was used sporadically but regularly after A.D. 1.

It is suggested from the correlation between the dates of the midden and the projectile point occurrences within the midden that cultural continuity is apparent at this site. A number of typically Late Archaic specimens have been dated to a period later than is generally accepted for Late Archaic assemblages. Moreover, there appears to be a distinction between Late Archaic forms such as Etley, Sedalia, Table Rock Stemmed, and Smith which are found in the same component and the Afton types which occur somewhat above the others in the last block of Locus II. Afton points may be a culturally unique entity.

Unlike many of the open sites in the reservoir area, the Cross Timbers Site will not be directly affected by the reservoir waters. It will be and has been, however, the site of a good deal of construction and recreational activity. Locus I, the site of boat ramp and parking facility construction, has been examined extensively through stripping of the plowzone. Locus II has yet to be impacted. For several reasons, it is recommended that measures be taken to reduce the impact on that area. This locus of 23HI297 appears to contain one of the longest continuous records of occupation of any open site in the project area. It is unique, however, in the respect that most of this record is intact. Other sites yield Early Archaic and Mississippian materials, but they are usually

side-by-side within the plowzone. At 23HI297 they are stratified.

Unfortunately, time permitted the excavation of only one unit into the earliest component of the site. It is recommended, particularly if any construction activity will affect the lower component, that further investigation of this component be undertaken. This represents material from the least well understood period of prehistory in the reservoir area, and because of its integrity, could provide valuable data.

While the later components at the site are among the best represented in the reservoir, further investigation of those with more refined techniques is critical. It appears that there may be a stratigraphic sequence preserved at the site which was not readily apparent using 10 cm and 2 x 2 meter excavation units. It seems that assemblages from two or more occupations were mixed using such units. Moreover, the stratigraphic sequence could be better controlled if more thermoluminescence samples were obtained from exact locations in association with diagnostic material; general level samples were sometimes ambiguous. The time depth, integrity, and large tool assemblage represented at 23HI297 could provide even tighter control on the prehistoric sequence of the reservoir area, if a larger sample was obtained.

PART V

SYNTHESIS

PART V

CHAPTER I

SOUTHWEST MISSOURI MORTUARY PRACTICES: ARTIFACT ASSEMBLAGE AND HUMAN SKELETAL ANALYSES

by

Sharon L. Brock and Susan K. Goldberg

INTRODUCTION

The present study contributes to the knowledge of the nature of the development and adaptation of the aboriginal population in the central Osage River Basin region of southwest Missouri. While the emphasis of other archeological research in the area has been on the technological and settlement systems of cultural adaptation, this study involves mortuary site analysis. Mortuary data were chosen because of their potential to elucidate cultural dynamics which might have occurred in non-technomic systems and as the primary source of biological information. Mortuary assemblages should reflect all aspects of the total system of adaptation, since they are a composite of the biological, technological, sociological, and ideological systems. Mortuary assemblage analysis should allow an understanding of the interrelationships between the population and the environment, between groups living within the region, and between these groups and others outside the region. The goals of this research can then be stated as including contributions toward an understanding of the demography, nutrition and health, social organization, and technology of the people occupying the area prior to extensive European contact.

The primary aim of many researchers in analyzing mortuary data is to test hypotheses about social status and to draw conclusions about the degree of social complexity in prehistoric groups. Patterning in burial type of placement and grave associations often permits such analyses (e.g., Buikstra 1972; Brown 1971; Peebles 1971). However, the situation in southwest Missouri does not allow many of these burial patterns to be identified on a site by site level. Information about burial types and artifact associations with burials is ambiguous due to formation processes, preservation problems, and the state of archeological inquiries when the burial tumuli were excavated, about fifteen years ago. Additionally, there is, at this point, inadequate

control over the basic reference dimensions of time and space to attempt any meaningful intrasite analyses.

Mortuary site data from southwest Missouri are extremely valuable, nonetheless, in contributing to an understanding of human adaptation and cultural interactions in the Ozark Highland during the Woodland and Mississippian periods. The value of the reanalysis of the mortuary data accrues primarily for three reasons. First, the artifact assemblages in the tumuli reflect changes in function and style of those tools typically used in other contexts. And yet, the sample size of these mortuary assemblages far outnumber those from other contexts. This fact allows strong tests of the cultural-historical statements that are derived from open-air and shelter sites in the region. Second, because of the special purpose of mortuary events, i.e., symboling status, burial accouterments also tend to be special as reflections of a high degree of energy expenditure. For this reason, artifacts obtained from outside the area, and thus presumably of more than just functional value, will tend to be over-represented in mortuary assemblages. These assemblages, then, become important for identifying the nature and extent of contacts with populations outside the area. Moreover, the definition and description of other regional complexes have often been based on mortuary practices and types of grave goods. Thus, the mortuary dimension seems appropriate for direct comparisons between cultural complexes. The third contribution of a reanalysis of the mortuary remains from southwest Missouri may be the most valuable. A variety of skeletal analyses will permit a nearly direct measure of human adaptation to the physical and social environments encountered in the region prehistorically.

The materials analyzed came from prehistoric burial tumuli[1] previously excavated in southwest Missouri (Fig. 1). This encompasses tumuli from the "Fristoe Burial Complex" (Wood 1961 and 1967), located primarily in the Harry S. Truman Reservoir project area, and from the Pomme de Terre and Stockton Reservoir areas (Table 1). The latter were included because of their proximity to the project area and their similarity to the Truman Reservoir materials. Their inclusion substantially increased the size of the data base, allowing spatial comparisons and conclusions of greater reliability to be made regarding mortuary behavior and biological and cultural adaptations.

---

[1]A tumulus is an artificial surface feature composed of earth and/or stone which was built for the purpose of disposal of the dead. Depending upon the volume of earth to stone, a tumulus may take the form of a mound or cairn. A mound is a structure predominantly earthen whereas a cairn is constructed principally of stone.

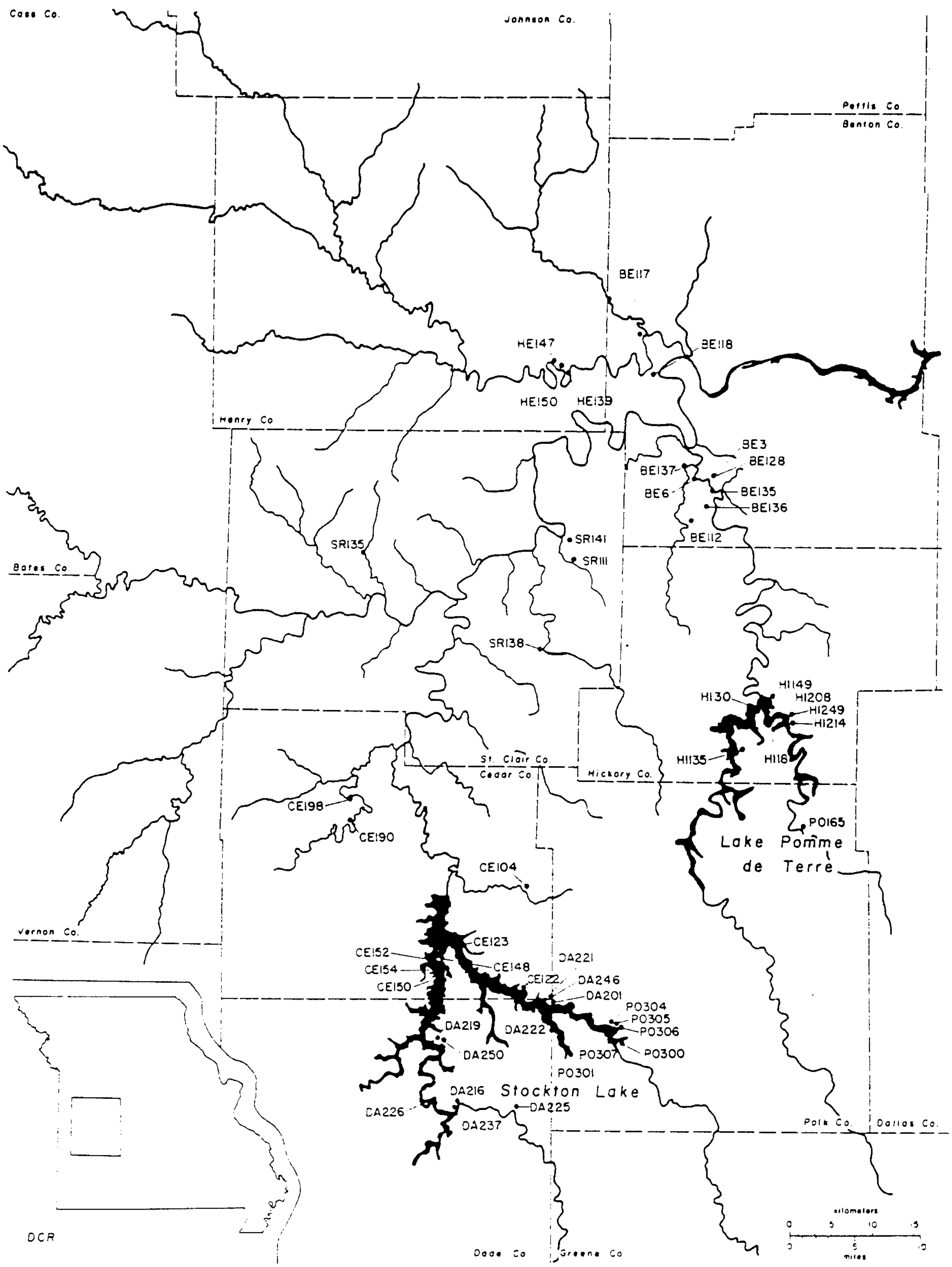


Figure 1. Tumuli in the sample.

TABLE 1

Burial Tumuli Used in the Sample and Their Previous Cultural Assignments

I. PRECERAMIC

Afton Burial Complex

HI-135	Holbert Bridge Mound (Wood, 1961)
PO-305	Colline "Mound" (Wood, MS)

II. WOODLAND

Fristoe Burial Complex

BE-6	Mound 1	)
BE-6	Mound 2 (cairn)	) Fairfield Mound Group
BE-6	Mound 3 (cairn)	) (Wood, 1961, 1967)
BE-6	Mound 4	)
BE-3	Wray-Martin Mound 1 (Wood, 1967)	
BE-128	Wray-Martin Mound 2 (Wood, 1967)	
BE-112	Gist Ridge Cairn (Wood, 1967)	
BE-117	Karr's Camp Mound (Wood, 1967)	
BE-118	Devil's Bluff Mound (Wood, 1967)	
BE-135	Melanin Mound 1 (Wood, 1967)	
BE-136	Melanin Mound 2 (Wood, 1967)	
CE-104	Simmons Mound (Bradham, 1963)	
CE-122	Clemons Mound (McMillan, 1968b)	
CE-123	Broyles Mound (Chapman and Pangborn, 1962)	
CE-190	Amith Mound (McMillan, 1968b)	
CE-198	Alberti Mound (McMillan, 1968b)	
DA-201	Morgan Mound (Wood, 1961, 1967)	
HE-139	Mandrake Mound (Wood, 1967)	
HI-30a	Indian Hill Mound (Bray, 1963b)	
HI-30c	Murelle Mound (Wood, 1961)	
HI-149	Cave Knob Mound (Wood, 1961)	
HI-209	Lindley Arm Mound (Wood, 1967)	
SR-111	Monteverdi Mound (Wood, 1967)	
SR-135	Woody Cairn (Chapman, 1965)	
SR-138	Magistrate Bluff Mound (Wood, 1967)	
SR-141	Briley Creek Mound (Wood, 1967)	
HE-148	Mt. Ilo Cairn (Falk and Lippincott, 1974)	
HE-150	Eckhardt Cairn (Falk and Lippincott, 1974)	

Unassigned

CE-148	Umber Point Mound (Wood, MS)
CE-150	Sorter Mound (Wood, MS)
CE-152	Bowling Stone Mound (Wood, MS)
CE-154	Sycamore Bridge Mound (Wood, MS)
DA-222	Tunnel Bluff Mound (Wood, MS)
DA-225	Bunker Hill Mound (Wood, MS)

DA-226 Divine Mound (Wood, MS)
DA-246 Paradise Tree Mound (Wood, MS)
PO-306 Slick Rock Mound (Wood, MS)

III. MISSISSIPPIAN

Unassigned

PO-300 Madrigal Mound (Wood, MS)
PO-301 Petit Cote Cairn (Wood, MS)
PO-307 King's Curtain Mound (Wood, MS)
HI-18 Lytle Cairn (Wood, 1961)
HI-30 Mount India Cairn (Wood, 1961, 1976c)
HI-209 Button Cairn (Bray, 1963a)
PO-304 Cordwood Cairn (Wood, MS)
DA-250 Eureka Mound (Wood and Pangborn 1968a; Pangborn, 1966)
DA-216 Sand Bluff Cairn (Wood, MS)
DA-237 Turnback Cairn (Wood, MS)

IV. UNASSIGNED PREHISTORIC

DA-219 Matthews Mound (Wood, MS)
BE-137 Barren Cairn (Wood, MS)
HE-147 Gobblers Knob Cairn (Falk, 1969)
PO-165 Star Ridge Cairn (Wood, 1961)

V. HISTORIC

Unassigned

DA-221 Comstock Mound (Wood and Pangborn, 1968a; Pangborn, 1965)

Two separate avenues were followed in investigating the material recovered from the burial tumuli. One analysis principally considered the artifact assemblages and tumulus structure (Goldberg Vol. III). The other investigated the human skeletons and the manner of their disposition (Brock, Vol. III). This paper represents a combination of those investigations; it interarticulates the findings of both toward an interpretation of the interaction between culture and biology in southwest Missouri. The conjunctive approach, advocated by Taylor (1968) and adopted here, will allow as thorough and detailed an evaluation of southwest Missouri mortuary behavior as is presently possible from our particular data.

A synthesis of the research of the archeology and of the physical anthropology of the burial tumuli will follow in Parts I and II, respectively. A full and detailed account of each investigation can be found in Volume III. It should be noted here that this chapter represents not only a synthesis of material presented in that volume, but incorporates additional information and interpretations. A lapse of about one year between the production of Volume III and this synthesis has allowed more detailed testing of original hypotheses – particularly those concerning the temporal dimension. Thermoluminescence dates from several tumuli permit original interpretations to be expanded upon, and in some cases, altered.

ARTIFACTS AND TUMULUS STRUCTURE

The results of analyses of two types of artifactual data are presented in this part. This study of the variability in and patterning of grave goods and of the tumulus form and structure has contributed greatly to an understanding of the prehistory of southwest Missouri. These contributions are not specific to mortuary behavior but rather have broader implications for many of the research questions posed during previous (Roper 1977) and current archeological investigations in the Truman Reservoir. The results of the artifact analyses (presented fully in Volume III) will be presented here as they relate to the following areas of inquiry:

1. How do the mortuary assemblages fit within the temporal framework developed from previous archeological investigations in southwest Missouri? Additionally, what information has been gleaned from these mortuary data to further refine the chronology of the area?

2. Were the groups in the region culturally conservative? Did culture change proceed at a slower rate than in other regions?

3. Was the population in southwest Missouri culturally isolated? To what degree did they interact with surrounding groups and what was the nature of this contact?

4. What was the nature of the occupation within the region? How extensive was interaction among various groups in southwest Missouri and did spatial segregation develop within the region?

5. Can the patterns in the mortuary assemblages be explained by environmental conditions in southwest Missouri?

Chronology

Using a factor analytic model to describe the patterns in the co-occurrence of fifty-five traits, including artifact forms, structural features, and the presence of corn (Table 2), a tentative seriation of forty-three of the tumuli was developed (Table 3). This original analysis produced at least six, and perhaps as many as eight, factors which described co-occurrences of artifacts which, in the Ozarks and other areas of the midwest, are temporally diagnostic. The technique of cross-dating, using those horizon markers, allowed the scaling of tumuli along a temporal dimension.

It was postulated that four general time periods were represented in the tumulus sample. The earliest of these was the Late Archaic period. Two tumuli, HI135 and PO305, were placed in this period on the basis of their unvarying projectile point assemblages; they contained only Afton points.

The next general period of Ozark prehistory which was represented was the Woodland period; nineteen tumuli were placed in this category. The factor analysis had revealed that Afton points (Late Archaic) were co-occurring with Snyders points and cut wolf-maxillae (Middle Woodland) and the Table Rock Stemmed points (Late Archaic) were co-occurring with Cooper and Rice Side-Notched points (both Late Woodland) forms. Tumuli scoring highly on these two factors, as well as those scoring highly on a sand-tempered pottery factor (presumed to be the dominant temper material in the earliest Midwestern pottery), were placed in the Woodland period. This period was then sub-divided on the basis of presence or absence of Scallorn arrowpoints. It was postulated that the four tumuli without arrowpoints were early in the sequence, as the adoption of the bow and arrow is presumed to have come relatively late in the Woodland period.

The third general period represented is the Mississippian, including seventeen of the tumuli. Three factors described co-occurrences of small triangular multiple-notched arrows, Keota arrows, limestone-tempered cord-marked pottery, as well

TABLE 2

Artifact and Structural Classes Used as Variables

I. Chipped Stone Artifacts

A. Arrow Points

Scallorn
Haskell
Keota
Late Woodland
Fresno
White River Elliptical
Crisp Ovate
Huffaker
Harrell
Washita
Reed

B. Dart Points

Rice Side-Notched
Cooper-like Corner-Notched
Variant of Rice Side-Notched
Guffy-like
McKonkey
Delaware
Marshall
Table Rock Stemmed
Cupp
Etley-like
Afton
Standlee (Langtry)
Gary
Snyders (Weber, Norton, Synders Affinis)

C. Drills

F-type drills
Other drills

II. Ground Stone

Celts
Pebble Mano
Shaped Mano
Hematite

III. Pipes

Ground Stone
Pottery

IV. Ceramic Vessels

Shell-tempered smooth
Shell-tempered cordmarked
Calcite-tempered cordmarked
Grog-tempered smooth
Limestone-tempered smooth
Limestone-tempered cordmarked
Sand-tempered smooth

V. Native Copper

VI. Corn

VII. Bone Artifacts

Cut-wolf-maxilla
Beads
Turtle
Awl/Pin
Antler cylinders
Other bone tools

VIII. Shell Artifacts

Anculosa/periwinkle beads
Mollusk beads
Marine Shell beads
Conch Pendant

IX. White Trade Goods

X. Tumulus Structure

Mound/cairn
Internal structure

TABLE 3

Tentative Seriation of Tumuli and Radiometric Dating Determinations

	Thermoluminescence	C-14
LATE ARCHAIC		
HI135*	900±427 B.C. 1045±200 B.C.	A.D. 1511±83
PO305*		
WOODLAND (pre-arrow)		
SR111		
SR141		
BE136	A.D. 1100±50	
CE122	A.D. 1400±50	
WOODLAND (with arrows)		
CE190		
HI30c		
HI30a		
HI149		
DA201		
HE139		
BE3	A.D. 965±80	A.D. 15±215
HI209		
BE118		
SR135		
DA246		
BE117		
CE148		A.D. 1000±120
SR138		
CE104		
MISSISSIPPIAN		
BE6-1	A.D. 1060±50	
DA216		
DA291		
CE123	A.D. 1150±60	
PO300		
DA250		
HI18		
BE135		
BE6-4		
PO304		

TABLE 3: Continued

Tentative Seriation of Tumuli and Radiometric Dating Determinations

	Thermoluminescence	C-14
CE152		A.D. 390±140
PO307	A.D. 1158±40	
PO306	A.D. 1458±30	
DA237		
DA225	A.D. 968±49	
HI30		
HI208		
LATE MISSISSIPPIAN		
CE150		A.D. 1090±100
CE154		
HE150		
DA226		A.D. 1262±57
CONTACT		
BE128	A.D. 1450±50	
BE6-2	A.D. 1250±50	
BE6-3		
PO301		
DA221		
SITES WITHOUT TEMPORAL INDICATORS		
BE112		
CE198		
PO165		
HE148		
DA222		

*not included in the factor analysis

as both smoothed and cord-marked pottery with shell-temper. A sub-division of this period is discussed below.

The latest period of tumulus building may have been during the time of Euro-American contact, after 1650. A factor including White trade goods, Fresno arrowpoints, and dart points similar to those occurring in proto-historic contexts elsewhere in Missouri describes this period. Five tumuli which scored highly on this factor and which actually included White trade goods were categorized as being from the contact period. The other four tumuli which scored highly on this factor were placed in the Mississippian period, but are separated from the other seventeen tumuli in that group. These four are presumed to be later in construction due to the presence of Fresno arrows and Delaware-like darts.

It was originally postulated on the basis of cross-dating that the major period of tumulus building in southwest Missouri began sometime late in the Woodland period, perhaps about A.D. 700, and continued into a period of Euro-American contact, no earlier than A.D. 1650. The two exceptions to this postulated 1000 year span were those which may have been erected during the Late Archaic period. This placement into such an early period was somewhat ambiguous due to conflicting radiometric dates from HI135; two C-14 ages from bone were 520±135 years: A.D. 1430 and 385±105 years: A.D. 1565 (Wood 1976: 311), while thermoluminescence techniques on an Afton point yielded 2864± 427 years: 900 B.C. (UMC18). The points are indicative of the Late Archaic, but the structure of the mound with its single extended burial is more similar to contact period tumuli. No matter what the true ages of HI135 and another mound with an Afton point, PO305, it appeared that a full-fledged burial program had developed in the area by the Late Woodland period and continued for about 1000 years.

Prior to the factor analysis which yielded the seriation discussed above, only a few radiometric dates from the tumuli were available (Table 4). The reliability of those dates was difficult to assess because there were so few. Some of the C-14 dates were unmistakably too early; CE152 which contained Mississippian arrowpoints dated at 1560±140 years: A.D. 390 (Crane and Griffin 1968) and BE3 which contained Hopewellian goods dated at 1855±215 years: A.D. 15 (Wood 1976: 311). To evaluate both these ages and the seriations a series of additional specimens were dated by thermoluminescence technique (Table 4 and Appendix B, Vol. I). The results were not received in time to be included in Volume III, the major mortuary analysis, but are discussed here.

Three major concerns about the chronology of the tumuli can be addressed: (1) was mounded burial occurring as early as the Late Archaic period? (2) did the history of mound building continue into the contact period? and (3) is the originally postulated relative ordering of the tumuli into four general periods valid?

TABLE 4

Absolute Dates from Tumuli

Site	Sample	TL Date	C-14 Date	Material Dated	Reference
PO306	4	643 BP±30		Cupp point	Mandeville, App. E, Vol. III
PO306	41	370 BP±30		Reed point	Mandeville, App. E, Vol. III
PO306	Average	507 BP±30			
DA225	49	997 BP±49		Flake	Mandeville, App. E, Vol. III
PO307	55	807 BP±40		Flake	Mandeville, App. E, Vol. III
HI135	18	2864 BP±427		Afton point	Mandeville, App. E, Vol. III
DA226	GX-678		485 BP±90	Woven bag	Wood 1976: 312
DA226	GX-677		840 BP±75	Chenopodium	Wood 1976: 312
DA226	Average		688 BP±57		
CE150	M-1932		860 BP±100	Charred corn	Crane and Griffin 1968
CE148	M-1902		950 BP±120	Charcoal	Crane and Griffin 1968
CE152	M-1967		1560 BP±140	Charred nuts	Crane and Griffin 1968
BE3	GX-559		1855 BP±215	Charred bone	Wood 1976: 311
BE3	GX-570		2175 BP±380	Charred bone	Wood 1976: 311
BE3	Average		1935 BP±215		
HI135	GX-558		520 BP±135	Unburned bone	Wood 1976: 311
HI135	GX-569		385 BP±105	Unburned bone	Wood 1976: 311
HI135	Average		439 BP±83		
Second Series of TL Dates					
HI135	-	3010 BP±201		Human tooth	Appendix B, Vol. I
BE3	38	1000 BP±80		Rice Side-Notched point	Appendix B, Vol. I
BE6-1	107B	905 BP±45		Cooper Corner-Notched point	Appendix B, Vol. I
BE6-2	102I	715 BP±50		Scallorn point	Appendix B, Vol. I
BE6-2	103D	905 BP±50		Rice Side-Notched Variant	Appendix B, Vol. I
BE136	15	865 BP±50		Rice Side-Notched point	Appendix B, Vol. I
CE123	100	815 BP±60		Fresno point	Appendix B, Vol. I
CE122	51	656 BP±50		Table Rock Stemmed point	Appendix B, Vol. I
CE122	-	615 BP±50		Adult tooth	Appendix B, Vol. I
BE128	14	515 BP±50		Pot lid	Appendix B, Vo.. I

The first question can fairly confidently be answered on the basis of a second thermoluminescence date from HI135 (Table 3). A tooth from the same burial whose bone yielded the average C-14 age of 493±83 years: A.D. 1511 (Wood 1976: 311), was TL dated at 3015±201 years: 1045 B.C. (UMC). This compares favorably with the earlier TL date on an Afton point 2864±427 years: 900 B.C. (UMC 18). These dates place at least that mound at the end of the Late Archaic period. Other TL dates from open sites (Appendix B, Vol. I) show, however, that the Afton form was in use as late as A.D. 900. Therefore, three other tumuli which each contained one Afton specimen cannot necessarily be dated to the Late Archaic period.

The question of the length of the tumulus building tradition in southwest Missouri is not totally answered by the TL dates. If the two latest TL ages are absolutely correct (BE128 – 515±50 years: A.D. 1450 [UMC 14] and PO306 – 507±30 years: A.D. 1458 [UMC]), then it would seem that our extension of the tradition into the contact period is unfounded. However, white trade goods in at least one tumulus, BE128, were undoubtedly placed with the burials at the time of interment; they are not intrusive. Since the earliest possible introduction of White trade goods into the area was about A.D. 1650, the most reasonable explanation (at least at BE128) is that the TL dates are slightly incorrect. Not all of the contact mounds have been dated and perhaps further radiometric determinations will confirm contact of aboriginal mound builders with Euro-Americans.

When the TL dates are used to evaluate the validity of the postulated relative chronology of the tumuli, some interesting conclusions come to light. It can be seen (Table 3) that, in several cases, the TL results date a tumulus to a later period than the period to which it was originally assigned (e.g., CE122, BE136, PO306). An explanation for these discrepancies is easily found. The misclassification is most likely caused by inadequacies of the factor analytic and seriation techniques when faced with a data set such as this.

The problem can be better understood as the cultural dynamics of the tumulus builders are presented in later sections of the chapter. To explain briefly, though, it appears that cultural inventories in the Ozarks after the Late Archaic period are the result of an additive process. A basic tool kit was in use and was widespread. In some cases, but not in all, other tool forms were gradually added to the basic assemblage, perhaps as the result of outside contacts. When using the cross-dating technique, such as was done here, temporal assignments are made on the basis of what is included in an assemblage. Thus, if a site includes a Mississippian arrowpoint, it can date to a period no earlier than the introduction of such points to the area. However, the inverse is not always true; because a tumulus does not

have Mississippian diagnostic artifacts does not necessarily mean that the tumulus was not built during the Mississippian period.

Due to the incompleteness of the TL dating series (only 10 tumuli were dated, and most of those were postulated to be Mississippian), it is impossible to assess the history of the tradition in the Woodland period. The earliest dates would place the beginnings of tumulus burial at about A.D. 950. It is suspected, however, that at least some of the fifteen tumuli with purely Woodland assemblages would date to several hundred years earlier. The presence of Hopewellian goods in some of the tumuli can best be explained if the beginning of the tradition is somewhat earlier than A.D. 950.

It is clear that another series of TL dates would greatly clarify the problems with chronology. Due to the homogeneity of cultural inventories in the Ozarks through a long period, cross-dating is simply an inadequate technique. This problem is even more acute in open sites throughout the reservoir area where assemblages are not as spatially bounded and where artifacts are not nearly as plentiful as in the tumuli.

Culture Change

Other patterns discerned through factor analysis of artifacts from the tumuli, as well as chi-square analyses of tumulus form (i.e., cairn or mound) and structure (i.e., internal features), permit conclusions to be drawn about culture change in the region. These conclusions regarding the mortuary assemblages have broad implications for the development of chronologies in the area, and for the ability of archeologists to distinguish between various cultural units after the Late Archaic period.

While twenty-seven tumuli were placed within the Woodland, Mississippian, or contact time periods (on the basis of artifact assemblages), several others were ambiguous. They either scored highly on several of the time sensitive factors, or on none at all. These two types of ambiguity in patterning, as well as the problems encountered in seriating the tumuli, can be explained by culture continuity. Cultural continuity is defined here as the retention of certain artifact styles into later periods, with the addition of new styles or forms. Those tumuli scoring highly on factors of two or three time periods were apparently constructed during the White contact period. However, due to slow cultural change, the cultural inventory of the tumulus builders still contained artifacts diagnostic of a Woodland time period. This pattern was most obvious in tumuli which contained large numbers of diagnostic artifacts. The same

pattern occurred in most of the tumuli; it was just not as obvious from the factor analysis, due to small sample sizes. In the other tumuli, which scored highly on only one temporal factor, there were usually low frequencies of artifacts characteristic of earlier time periods.

A similar interpretation of cultural continuity can be given for those tumuli which did not score highly on any of the temporal factors. These tumuli contained only a few of the temporally diagnostic artifacts or none at all. The pattern which these cases emphasize is seen also in the tumuli scoring highly even on factors from just one time period. That is, while there are some grave goods which can be used to assign a tumulus to its earliest date of construction (i.e., artifacts whose co-occurrence caused temporally sensitive factors), these artifacts do not constitute the entirety or even the majority of the items in each assemblage. Woodland diagnostics occur in tumuli which were constructed in the Mississippian period and in the contact period. Moreover, there are artifact types, such as Scallorn arrowpoints and Rice Side-Notched darts, which often constitute the majority of items in each assemblage, and yet due to their ubiquity are not important in the formation of any one temporal factor. Because these artifacts occur so frequently, they tend to co-occur with many other types of artifacts, and thus, load intermediately on many factors. So, while there are a few temporal markers in the tumulus assemblages which serve to describe the time depth of the burial complex, the underlying pattern of continuity is significant. There appears to have been a basic culture inventory which was common to almost all of the tumuli, and which formed the largest part of the burial assemblages. Such a pattern began in the earliest part of the complex and was retained until the end of the period of tumulus burial in southwest Missouri.

This same pattern of continuity is seen in the form and structure of the tumuli themselves. Three types of internal structuring occurred in various tumuli: sub-floor pits, ring-like accumulations of rocks, and undifferentiated fill. A chi-square test showed that these three forms occurred in a nearly random pattern along the temporal dimension. Another chi-square test showed that there was some change through time in the number of mounds (earth and rock fill) relative to cairns (primarily rock fill), with cairns being more prevalent in the "Mississippian" and "contact" periods. The first test clearly points to the continuity of a burial pattern throughout the entire period of tumulus building. The second test, indicates that a change did occur through time in the notion of appropriate burial monument construction. This change, too, was gradual; neither of the tumulus forms occurred to the exclusion of the other during the last three periods.

The key to understanding the difference between the changes that occurred in form and in structure of the tumuli may be found in an examination of the possible origins of these traits. This requires the identification of the types and degree of interactions that the southwest Missouri population had with groups in other regions.

Cultural Isolation

A number of researchers have characterized the prehistoric cultures in the Ozark Highland as marginal and culturally isolated. They suggest that although the Ozark population was spatially close to eastern Woodland and Mississippian cultural developments, it was not greatly influenced by them (Willey and Phillips 1958: 124-125; Willey 1966: 250; Chapman 1952; Wood 1961: 118, 1967: 126; Baerreis 1951 and 1959). Three types of evidence from the burial tumuli in southwest Missouri have bearing on this question of cultural isolation. Artifact styles and their co-occurrences, tumulus form and structure, and chert source data were used to evaluate the cultural relationships and the extent of interaction with other regional cultural manifestations.

The artifact assemblages in the tumuli suggest that there was contact with outside groups. The tumuli contained stone tools, such as Scallorn and Gary points as well as bone tools which seem to be widespread and indicative of a general pattern of adaptation to a woodland environment. Additionally, all of the tumuli contained artifacts which seem to be more regionally restricted, with a character or style all their own. Afton, Rice Side-Notched, variants of Rice Side-Notched, and Cooper-like corner-notched points fit into this class. However, several of the assemblages have artifacts which must have derived from elsewhere, either in idea or physical form, through encounters with outside populations. Three major periods of contact can be identified, and form the basis for the previous seriation of the tumuli.

The earliest evidence of contact is in the form of classic "Hopewellian" artifacts, such as Snyders points, cut wolf-maxillae, and a cup-stone or mammiform object. One of the more ubiquitous point types, Cooper-like corner-notched, may also be the result of contact with "Hopewellianized" people. Cross-dating of artifacts seems to indicate that the population in southwest Missouri was in contact with peoples to the north, perhaps near the Missouri River, around A.D. 700.

The next period of contact that can be identified is the "Mississippian." Artifacts such as multiple-notched, triangular arrow points, diagnostic vessel forms and temper types, and possibly maize, all indicate that people in the study area were in contact with Mississippian cultures. At

least part of this contact was with Caddoan populations to the southwest, but there may also have been contact to the east, perhaps with Cahokia, and to the west.

The third period of contact was sometime after A.D. 1650. As evidenced by some White trade goods in the tumuli, the southwest Missouri inhabitants were in contact with Euro-Americans.

Other artifact forms, although not time-specific, do indicate contact. The presence of shell, both as finished ornaments and raw material, implies contact, either directly or indirectly, with the Gulf Coast. The procurement of either raw material or the finished product from non-local chert deposits was also prevalent. Approximately ten percent of the finished tools in the tumulus assemblages are made from exotic cherts.

The tumulus form and structure are further evidence that the southwest Missourians were not totally isolated. In fact, it is proposed that the idea of erecting monuments over the dead was derived from Hopewellian influenced peoples to the north. Mound burial is a form common to populations along the Missouri River as far north as South Dakota. These mounds have been explained as being indicative of contact with Hopewellian cultures, quite probably from the center in Illinois (Eyman 1966; Wedel 1943; Neuman 1975). All of the tumuli along the Missouri River are earth-fill mounds, and thereby dissimilar in form to those in southwest Missouri. However, along several of the smaller tributaries of the Missouri there are tumuli which are quite similar to those in the study area and which contain "Hopewellian" artifacts. The stone rings in some of the southwest Missouri tumuli are also reminiscent of stone chambers in the Mississippi River mounds. Thus, there is a great deal of evidence to indicate that, while there was contact with outside populations, its effect on southwest Missouri occupants was minimal. This appears to hold even when formal qualities and artifact types denote direct contact with other people. The southwest Missouri complex has many characteristics indicative of direct encounters with Hopewellians. For example, the adoption of monument erection was greatly modified to fit existing mortuary patterns and needs as dictated by the environment. Thus, rock was used as fill; the internal structure, or lack thereof, indicates minimal energy expenditure; secondary burial, and burning may indicate the persistence of scaffolding prior to interment; broadcast artifacts[2] rather than placement with individuals indicates a lack of defining or differentiation of social status; and the small size of each tumulus, containing few individuals, suggests small aggregates of people.

[2]Artifacts scattered throughout the tumulus fill.

Perhaps the period with the greatest amount of contact was the Woodland period. During this time burial practices and artifact form both seem to have been affected by outside influences. However, the number of exotic artifacts was relatively small. While chert was procured from outside the region, most of the exotic chert was used to make artifacts of a style similar to the remaining tumulus assemblages.

The minimal effect of contact implied by the cultural inventory upon the regional population continued into the later periods when "Mississippianization" was occurring elsewhere. Two changes that occurred within southwest Missouri were in the types of exotic artifacts, possibly obtained from different areas, and a greater frequency of cairns. This latter formal change may be due to a lessening of energy expenditure; given the rocky bluff-top location of the tumuli, gathering earth for fill would represent maximal energy expenditure. None of the massive, elaborate Mississippian platform mound-building of other areas has yet been discovered in southwest Missouri. The only potentially significant change apparent during the late period is the presence of charred maize in several of the tumuli. The contribution of corn harvesting is seen to be minimal, as evidenced by the effects observed upon the skeletons.

The evidence for cultural isolation is further supported by the relationship which existed between the mortuary sites and other site types. Artifactual remains indicating contact were found primarily, albeit not exclusively, in a mortuary context. Furthermore, most of these remains were confined to those tumuli on the highest order streams in the area. A likely explanation for such patterning is that it resulted from trade relationships maintained with that part of the southwest Missouri population most accessible – those settling along potentially navigable streams. Items obtained by trade may have been considered special and were, therefore, not used in their originally intended functional context. Rather, their increased value may have dictated use as a means of conveying special meaning, as generalized symbolling of the deceased.

Internal Cultural Dynamics and Environmental Adaptation

Given that the population in southwest Missouri was culturally isolated and conservative, certain patterns of interaction were developed within the region. Based on artifactual evidence, the population in some ways appears to have been principally homogeneous. There are basic similarities in tumulus structure and artifact styles which must be the result of extensive interaction between communities occupying the area. Yet, in other ways there is extreme heterogeneity in the assemblages as exemplified in regional variation in artifact styles.

These internal patterns of variation, as well as the cultural isolation and conservatism, can best be understood as responses to the environmental conditions in southwest Missouri. These adaptational responses involved both the cultural and biological systems of the population, and the mortuary remains can be explained by the interaction of these two systems. Following the presentation of the skeletal data, this interaction can be explored more fully.

HUMAN SKELETAL AND MORTUARY DYNAMICS

From the study of human skeletal remains and the treatment accorded their burial, descriptions and interpretations of the culture-history of a once living people are to be formulated. The task is difficult, especially when the skeletons are fragmentary and the burial areas scarred by the forays of pot-hunters. An adequate or even satisfactory completion of the task is not desired. This investigation requires a thorough, encompassing research design, especially since this report represents the first statement of prehistoric human biology in southwest Missouri.

To do justice to the bioarcheology of southwest Missouri, the skeletal material must be wrung of all information that can possibly be acquired by currently available techniques. To this end, data were compiled from specific skeletal sources and from features pertinent to the burial dynamics of each tumulus. A total of forty-eight tumuli yielding 302 individuals comprised the sample. Analyses undertaken include assessment of the demographic profiles of the prehistoric inhabitants of southwest Missouri, the social implications of mortuary behaviors, and an evaluation of the orofacial and gnathic complexes. Each analysis is intended to contribute toward the overall documentation and interpretation of human adaptation as indicated by the skeletal biology. A comparison between the southwest Missouri population and populations outside the area is then possible.

An approach applicable to the assessment of the skeletal biology within the population of southwest Missouri was supplied by the data themselves. Corn was recovered from some but not all of the burial tumuli. Corn is a high carbohydrate, low-protein food which, when contributing heavily to the diet creates a nutritional imbalance and subsequent nutritional deficiency (Cook 1975; Gilbert 1975; Lallo 1973; Stini 1971). Effects which are expressed skeletally include a greater incidence of infectious disease, a greater frequency of oral pathologies, and shorter stature. Additionally, the mortality rate, especially of the subadults, is higher in populations dependent upon corn.

Thus, an evaluation of the significance of corn as revealed in the human skeleton poses as a productive means of

assessing human adaptation within southwest Missouri. Predictions can be posited regarding the relationship between the group of individuals from tumuli with corn and the group without corn within the southwest Missouri population, and between the combined southwest Missouri groups and neighboring populations of comparable subsistence strategies. As the series is representative of an interbreeding lineage or population, comparison of the southwest Missouri population with populations outside the area is permitted.

The intention of this part is to synthesize the findings of all analyses conducted upon the human skeletal remains and of their mode of interment. To facilitate the presentation of the results, the discussion is separated into (1) Southwest Missouri: Individuals With Corn and Individuals Without Corn and (2) Southwest Missouri: Composite. Following these synopses, a concluding statement will encapsulate the cultural and biological adaptation of precontact southwest Missourians as determined from those results.

Southwest Missouri: Individuals With Corn and Individuals Without Corn

The sample of individuals with corn and individuals without corn were of sufficient sizes to permit analyses of demography, skeletal and dental pathology, dental attrition and asymmetry, and burial dynamics. A series of predictions were generated outlining the expected relationship between individuals with corn and individuals without corn, and among these southwest Missouri subgroups and neighboring populations. The generation of a set of predictions was not a viable approach in all of the analyses. Comparable data were either not available or current knowledge of a particular topic was inconclusive making any predictions premature. In such cases, the data were investigated for attributes revealing an ability to discriminate between the subgroups of individuals with corn and individuals without corn from southwest Missouri. The series of predictions are listed below followed by the research questions explored for subgroup discrimination:

Predictions:

1. Individuals with corn will have a higher mortality rate, especially for the ages 0-15 years, as compared to individuals without corn.

2. Individuals with corn will have a greater incidence of infectious disease relative to individuals without corn.

3. Individuals with corn will be shorter in stature relative to individuals without corn.

4. Individuals with corn will have relatively faster rate of dental wear as compared to individuals without corn.

5. Individuals with corn will have a greater amount of oral and dental pathology than individuals without corn.

6. Individuals with corn will reveal a degree of dental asymmetry comparable to populations of hunter/farmers (e.g., Campbell and Larson sites series), whereas individuals without corn will show a similar degree of asymmetry to a population of non-farmers (e.g., the Kentucky Indian Knoll series).

Discriminations:

1. Do significant differences exist in dental and oral pathology between individuals with corn and those without?

2. Does the orofacial architecture differ significantly between individuals with corn and individuals without corn?

3. Do tumuli containing corn express aspects of burial dynamics that differ from tumuli lacking corn? If so, is there a tendency for the tumuli to segregate into those with corn and those without corn on the basis of this shared variation?

Responses to the above expectations and inquiries follow under the headings of Demography and Health, Burial Dynamics, and Dentition. Details of each analysis and of the statistics used will not be presented as such elaboration can be found elsewhere in this compendium (Brock, Vol. III).

DEMOGRAPHY AND HEALTH

The life table technique (Acsadi and Nemeskeri 1970) was used in estimating mortality rates for prehistoric inhabitants of southwest Missouri. The values computed regarding survivorship and mortality revealed subtle differences between individuals with corn and individuals without corn. Principally, subadults without corn and adults with corn had a slightly better chance of survival than their non-corn counterparts. Overall, however, the demographic profiles indicate that the groups have a 95% probability of belonging to the same population (Kolmogorov-Smirnov two-tailed test, $p>.05$). Nevertheless, the relatively higher death rate of subadults with corn raises the provocative question concerning the role corn played in effecting these results.

The incidence of infectious disease, as determined from macroscopic observations of the adult and subadult skeletons, did distinguish between the groups. A significantly greater proportion of individuals with corn expressed bone inflammation indicative of infectious disease than did individuals without corn ($X^2=4.037$, $p<.05$). The occurrence of infectious

disease in the entire series was low, however, and not suggestive of a severity of endemic proportions. Thus, if corn can be implicated in influencing the results, its consumption had not considerably weakened the body defense against bacterial agents. This is especially evident as the mortality rates between the groups were comparable. Also, nutritive deficiencies associated with heavy consumption of corn impairing somatic and skeletal growth were not reflected in the stature data. There was not a significant difference in height between individuals with corn and individuals without corn.

BURIAL DYNAMICS

Burial dynamics were perceived as encompassing three potentially analyzable aspects of mortuary behavior. A coarse analysis of burial types (i.e., extended, bundle, ossuary, etc.) was made and a fine analysis of the forms of burial was conducted on each individual grave (i.e., age, sex, body preparation, etc.). A third analysis examined features of the tumulus such as presence or absence of burial pits, masonry chambers, and the composition of the fill. Techniques of cluster analysis and multidimensional scaling were employed to investigate the interrelationships and patterning in the data.

The analyses revealed a heterogeneity within all data sets relevant to the individual grave. The random patterning of the variables was interpreted as suggesting a lack of status or social differentiation among either group, and as demonstrating no difference in societal complexity between the groups. The patterning of the tumuli was similarily random.

The tumuli formed nine groups (comprising forty-two of the forty-eight tumuli) on the basis of shared variation; six tumuli were unique. Of these nine groups, only one group of three mounds contained exclusively corn-yielding tumuli. Characteristics signifying relatively greater interment complexity and elaboration appeared to be the segregating variables rather than the presence of corn. In summary, the tumuli aggregated principally on individual burial and tumuli structure commonalities. The presence of corn did not seem to dictate whether specific burial dynamics should occur.

DENTITION

Principal axis analysis was the technique used to assess the rate of wear of the posterior dentition (Scott 1974 and 1979). Once the principal axis was computed, it was fitted to the scattergram of the bivariate distribution of the degree of dental wear observed for the sample (e.g., M1 plotted on the X-axis and M2 on the Y-axis). The angle of

the principal axis with the Y-intercept and the slope of the major axis became the comparative statistic. More obtuse angles corresponding to high slopes indicate a rapid rate of wear. The technique estimates the difference in the amount of wear which accrues during the six year interval separating the eruption of adjacent molars. The resulting population estimate of the dental wear rate is independent of age; the age distribution of the sample is, therefore, not a deciding variable.

It was assumed that the high abrasive content of corn would cause rapid dental attrition in those individuals presumed to be consuming corn. This was found not to be true. Individuals without corn revealed a faster rate of tooth wear than individuals with corn, but the difference was not statistically significant. The slower rate of dental attrition of individuals with corn was significantly correlated with a greater frequency of caries ($r=.038$, $p<.05$).

The subgroups from southwest Missouri were compared to dental rate data provided by Scott (1979) from Indian Knoll, a Kentucky Archaic series of hunter/collectors relying principally upon shellfish, and two groups of horticulturalists: the Hardin site, a Ft. Ancient village also in Kentucky and the Campbell site, a Mississippian population from southeast Missouri. Of all series compared, individuals with corn from southwest Missouri had the slowest rate of tooth wear. The nearest counterpart was the Missouri Campbell population. Values for individuals without corn from southwest Missouri fell between Indian Knoll and the Campbell series, with a slower rate of wear than the former but a faster rate than the Mississippians of the Campbell site.

The incidence of caries computed for the southwest Missouri subgroups was the only variable of oral pathology investigated that revealed a significant difference between the groups ($X^2=7.72$, $p<.01$). The association between less wear and more caries is logical as areas favorable to bacterial growth are longer-lived, allowing decay to set in and carious lesions to form. A higher carbohydrate intake may be implicated in the increased prevalence of oral decay observed in the individuals hypothesized as corn consumers.

Using a principal components analysis to identify measurements of the orofacial architecture most responsible for the variation, the mandibular buccal-lingual diameter and certain measurements of orofacial structure exclusive to the mandible were found to significantly discriminate between the groups ($p<.10$). The tendency was toward greater size in the individuals with corn. The results were found not to be influenced by intragroup sexual dimorphism or age. Thus, differences in dentofacial size were documented for the southwest Missouri population with individuals with corn having larger dimensions than individuals without corn.

Degree of fluctuating dental asymmetry (asymmetry favoring neither side) was estimated by intercorrelating (Pearson's product-moment correlation coefficient) the buccal-lingual diameter of a left sided tooth with the same tooth on the right side, e.g., LM1-RM1. Low correlations were indications of asymmetry.

The assessment of asymmetry of antimeric posterior dentition showed individuals without corn to have relatively more dental asymmetry than individuals with corn. The differences in tooth pairs were statistically significant at the .05 level only for the M_2 and M_3; average molar asymmetry was significantly different at the .10 level. The antimeric values for the southwest Missouri subgroups were compared to those from a skeletal series representing a group of hunter/collectors (Indian Knoll) and a series representing hunter/farmers (Campbell/Larson combined series) (data from Perzigian 1977). Southwest Missouri individuals with corn were found to resemble the hunter/farming series in being more dentally symmetric than the hunter/collectors. Individuals without corn revealed the greatest degree of asymmetry of all groups compared.

Southwest Missouri: Composite

The composite population from southwest Missouri was investigated primarily for any inherent patterning with the biological data. Few expectations were imposed. The analyses of Demography, Burial Dynamics, and Dentition permitted observation for differences by age and/or sex and allowed comparison with population outside the area when comparable data were available.

DEMOGRAPHY

The life table figures and graphs of survivorship and mortality clearly displayed differences in the female and male profiles. Females were dying at a younger age, especially during the late twenties and early thirties. The greater frequency of female deaths during those years may be attributable to stresses of child bearing. The sex differences in mortality were statistically significant (Kolmogorov-Smirnov two-tailed test, $p<.05$). Other than the peak period of female mortality, males of all ages experienced a higher death rate than females. The mortality figures for southwest Missouri are in accordance with current demographic theory as male mortality of typically exceeds female mortality in human populations both historically and prehistorically (see Ascadi and Nemeskeri 1971; Weiss 1973).

The southwest Missouri values were compared to available data from Woodland and Mississippian populations in Illinois

(Lallo 1973). As the postulated subsistence-settlement system and general economy of southwest Missouri nearly approximates the pattern of the Woodland rather than the Mississippian periods of the Illinois River Valley, it was hypothesized that southwest Missouri mortality would resemble the Illinois Woodland.

The pre-adolescent years were closely similar to the Illinois Woodland series. However, poor preservation of subadults and/or alternate methods of burial for younger members of the community must be considered when judging these results. Adult mortality did not resemble any of the Illinois populations compared; the probability of dying was much higher for southwest Missouri with a concomitant lowering of life expectancy.

BURIAL DYNAMICS

The data set of individual bodies introduced and described in an earlier section was suited to investigations of age and/or sex related differences. All forms of energy expenditure afforded an individual grave may be potential indicators of conferred status. The method of cluster analysis and the chi-square statistic were employed to test for patterned variation in the diversity displayed by the individual burials. Distinctive groupings of attributes distinguishing the individuals by age and by sex were not formed in the cluster analysis. Frequency distributions, computed by cross-tabulating the burial attributes by age and by sex were examined by contingency table analysis for significant associations.

The results of the chi-square analysis indicated a high degree of similarity between the sexes; subtle differences in grave locus within a tumulus were noted but were not statistically significant. Subadults and adults also shared numerous attributes. However, less concordance in burial form was observed by age than by sex. Generally, adults were accorded more autonomy of burial than subadults. The only statistically significant difference realized by the entire data set was that more adults were being burned than subadults. The greater incidence of broadcast adult burials[3] relative to the subadults may have distorted the results somewhat. However, the possibility of differential treatment of individuals by age through differential burning practices cannot be ignored.

A great amount of variability and randomness in burial treatment within a firmly bounded and consistent range of

---

[3]Broadcast burial consists of fragmented burned and unburned human bone scattered through a tumulus.

variation was observed throughout the study area. The regional similarity is interpreted as reflecting community preference and stylization upon a basic custom. The isomorphism and variability were visually demonstrated in the cluster and contingency table analyses. The homogeneity of the analyses depicted the predominance of non-discriminatory behaviors in the prehistoric mortuary practices of southwest Missouri. As status differences and class stratification were not obvious or well-represented in the population, an egalitarian form of social organization with equal recognition regardless of age at death or of sex is advanced.

DENTITION

The prerequisite of having a full complement of permanent posterior dentition limited the number of individuals contributing to the dental analyses. The constriction of the sample size was most notable when differences by age and sex were desired. The segregated samples were too small for meaningful interpretation except in the analyses of attritional rate and of fluctuating dental asymmetry. In the former, the sample was divisible by sex and in the latter, by age. Comparative data applicable to the attritional analysis was available from neighboring populations.

Attrition

Employing the same techniques as described previously, the females revealed a slower rate of wear than the males. The differences were not significant (F-ratio, $p>.05$), permitting combination of the sexes for comparative purposes.

The southwest Missouri results were again compared to data provided by Scott (1979) from the Indian Knoll, Hardin, and Campbell sites. Initially, it was observed that the rate of wear for the southwest Missouri maxillae and mandibles did not coincide. A similar disagreement in the gnathic complexes were noted in the Hardin and Campbell series. The southwest Missouri rate of wear values closely approximated the horticulturalists, especially the southeast Missouri Campbell series. The southwest Missouri maxillae wore at a slightly faster rate whereas the mandibles attrited somewhat slower than their Missouri neighbor. Both Missouri populations had a dental rate much slower than that of the Kentucky Hardin and Indian Knoll series.

The concordance between the southwest Missouri hunter/collector/gardeners and the southeast Missouri horticulturists may be interpreted as indicating a diet of similar abrasive content or a similar resource base, or possibly complementary cultural practices. Ecozonal differences resulted in the quantity of certain foods available for exploitation or intensification to vary within each region. Also, corn is

considered a supplement to the southwest Missouri diet rather than a staple reliance as with the southeast Missourians. The degree of cultural development alone cannot explain the results as the Mississippian population manifested a complexity beyond that postulated for southwest Missouri. A harmonization of cultural and biological adaptation to a fairly abrasive dietary regime may best explain the congruence observed in the rate of dental wear.

Fluctuating Dental Asymmetry

Average molar asymmetry for the groups aged 18-20 with five year increments up to 45 years of age were computed. The magnitude of age related asymmetry and the presence of greater stress among the younger individuals, evinced by smaller buccal-lingual diameters, was tested. Younger Individuals were found not to have smaller tooth dimensions than older individuals nor was there any evidence of differential stress between younger and older adults. Differences in asymmetry with age were observed. Significant asymmetry occurred in the 18-20 and 31-35 year old groups. The results must be considered tentative, however, as the sample sizes per age group were quite small.

Conclusions

The skeletal series, regardless of the occurrence of corn, represents a genetically continuous population or lineage. The mortality frequencies, dentofacial measurements specific to the mandible and the degree of fluctuating dental asymmetry do differentiate between the individuals from tumuli with corn and individuals from tumuli without corn. The data, however, do not support a reliance upon corn. The degree of biological similarity between the assumed consumers and nonconsumers would not be as uniform if corn were a major component of the diet. The results are congruent with an explanation presenting corn as a dietary supplement. Exploitation of the native floral and faunal assemblages continued to be the primary means of food procurement; corn served merely as an addition to the existing nutritional base. Individuals benefiting from the caloric enrichment were healthier relative to the others as indicated by their longevity, larger facial dimensions, and more symmetrical molars.

Levels of social status were not evident in the mortuary behaviors of the southwest Missourians. Differences reported between individuals with corn and individuals without corn might be prematurely interpreted as indicating a temporal separation between respective tumuli. Although the artifact assemblages from the tumuli signify a Woodland and a Mississippian component (Goldberg, Vol. III), not all "Mississippian"

tumuli contained corn and several "Woodland" tumuli did contain corn. The demographic profiles computed for the skeletal series associated with each component (artifact content classification) were essentially identical. A temporal separation cannot, therefore, be advocated. Also, the utilization of corn by one community does not necessarily imply its use by the surrounding communities.

The biological systems analyses have discerned an impact of the consumption of corn upon the human skeleton, but the magnitude of the impact suggests minimal and supplemental use of the grain. Cultural continuity and persistence in behaviors related to mortuary practices were also demonstrated.

As both the cultural and biological systems have now been examined, the interaction of these two systems forming the dynamics of the adaptational responses of the aboriginal population to the environmental conditions of southwest Missouri can be presented.

BIOCULTURAL DYNAMICS AND ENVIRONMENTAL ADAPTATION

Around A.D. 700, corresponding to the Late Woodland period as defined from the Midwest regional taxonomy, the idea of tumulus construction was incorporated into the mortuary behavior of the occupants of southwest Missouri. The practice persisted into the era of Euro-American contact (ca. A.D. 1650). Thus, construction of a tumulus as a depository for the dead spanned the Woodland, Mississippian and contact periods. The cultural inventory of a single tumulus often contained artifacts diagnostic of earlier and later periods. Yet, the predominant component of each tumulus comprised an artifactual assemblage common to nearly all of the tumuli. Such a generalized pattern of mortuary inclusion through time (nearly 1000 years) is interpreted as indicating a high degree of cultural continuity.

This interpretation of cultural remains is supported biologically as individuals showed intra- and intertumulus homogeneity; the skeletal series from all tumuli represent an interbreeding lineage. Continuity was also documented for tumulus features and interment types, although cairns became the more predominant structure in the later years. Neither mounds or cairns occurred to the exclusion of the other, however.

A spatial difference was recorded between Woodland and Mississippian tumuli. Woodland cemeteries were scattered throughout the area with few distinct clusters. High order streams, stream confluences and an aggregation in the southern portion of the area were primary characteristics of Mississippian tumuli. A form and spatial distinction in the tumuli were documented through time, but internal structure

retained a randomness. Such changes, progressing slowly and gradually, are attributed to a cultural change as little or no major environmental fluctuations are known to have occurred since around 3000 B.P.

The region of southwest Missouri, therefore, cannot be described as an area of cultural lag or as maintaining a completely isolated population. Contact with Hopewellians, Mississippians, and Euro-Americans is evidenced by artifacts, artifact types, and certain cultural behaviors. The data indicate that contact resulted in the adoption of select items and traits rather than rigid incorporation or wholesale replacement. For example, the idea of erecting monuments over the dead was probably a trait adopted from Hopewellian influenced people to the north. However, aside from tumulus form and some aspects of the structure, all features of the burial program can be attributed to the local population. Introductions were grafted onto the southwest Missouri culture where they underwent further modification to meet environmental and community dictates. For instance, knowledge of corn horticulture did not exert considerable influence on the cultural pattern. The biological data indicate that some communities cultivated a limited amount of maize. The overall impact of corn utilization was minimal both economically and nutritionally, and was not regionally felt. In summary contact was evident but the pre-existing adaptations and technologies were unchanged or little affected by the contact.

A basic cultural system, principally comprising traits typical of a generalized Woodland pattern, and adapted to the Ozarks is suggested from the analysis of the mortuary data. Within this system there was some regional variation as would be expected in an area where small mobile groups were at a premium. Yet, no regional differences were apparent in the form or structure of the burial tumuli implying that intragroup contact and exchange was frequent enough to permit a homogeneity in the burial program.

Binford (1971) has demonstrated that the complexity of social organization conditions the form and structure of the mortuary complex. A form of social structure analogous to egalitarianism is indicated by the interment and osteological data. Such a form is congruent with the settlement-subsistence pattern of a diffuse economy practiced by small semi-permanent groups postulated for the Ozarks. The mortuary practice best exemplifies an activity carried out by individual communities or perhaps during periods of community aggregation.

REFERENCES CITED

Acsadi, G. and J. Nemeskeri
1970 History of human life span and mortality. Akademiai Kiado, Budapest.

Baerreis, D. A.
1951 The preceramic horizons of northeastern Oklahoma. University of Michigan, Museum of Anthropology, Anthropological Papers 6.

1959 The archaic as seen from the Ozark region. American Antiquity 19(3): 270-275.

Binford, L.
1971 Mortuary practices: their study and their potential. In Approaches to the Social Dimensions of Mortuary Practices, edited by J. A. Brown, pp. 6-29. Society for American Archaeology Memoirs 25.

Brock, S. L.
1980 Prehistory of southwest Missouri: human skeletal and mortuary dynamics. This report, Vol. III. Part 2.

Brown, J. A.
1971 The dimensions of status in the burials at Spiro. In Approaches to the Social Dimensions of Mortuary Practices, edited by J. A. Brown, pp. 92-112. Society for American Archaeology Memoirs 25.

Buikstra, J. E.
1972 Hopewell in the lower Illinois River Valley: a regional approach to the study of biological variability and mortuary activity. Unpublished Ph.D. dissertation, University of Chicago.

Chapman, C. H.
1952 Culture sequence in the lower Missouri valley. In Archeology of Eastern United States, edited by J. B. Griffin, pp. 139-151. University of Chicago Press, Chicago.

Cook, D. C.
1975 Changes in subsistence base: the human skeletal evidence. Paper presented before the 74th annual meeting of American Anthropological Association, San Francisco, California.

Eyman, C.
1966 The Schultz focus: a plains middle woodland burial complex in eastern Kansas. Unpublished M.A. thesis, University of Alberta, Calgary.

Gilbert, R. I.
1975 Trace element analysis of three skeletal Amerindian populations at Dickson Mounds. Unpublished Ph.D. dissertation, University of Massachusetts, Amherst.

Goldberg, S. K.
1980 The mortuary assemblages in southwest Missouri: evidence for continuity of a Woodland pattern. This report, Vol. III, Part 1.

Lallo, J. W.
1973 The skeletal biology of three prehistoric American Indian societies from Dickson Mounds. Unpublished Ph.D. dissertation, University of Massachusetts, Amherst.

Neuman, R. W.
1975 The Sonota complex and associated sites on the northern Great Plains. Nebraska State Historical Society Publications in Anthropology 6.

Peebles, C. S.
1971 Moundville and surrounding sites: some structural considerations of mortuary practices. In Approaches to the Social Dimensions of Mortuary Practices, edited by J. A. Brown, pp. 68-91. Society for American Archaeology Memoirs 25.

Perzigian, A. J.
1977 Fluctuating dental asymmetry: variation among skeletal populations. American Journal of Physical Anthropology 47: 81-88.

Roper, D. C.
1977 The archaeological survey. Cultural Resources Survey, Harry S. Truman Dam and Reservoir Project, Vol. IV. Report to the U. S. Army Corps of Engineers. American Archaeological Division, University of Missouri-Columbia.

Scott, E. C.
1974 Dental variation in Pre-Columbia Coastal Peru. Unpublished Ph.D. dissertation, University of Missouri-Columbia.

1979 Principal axis analysis of dental attrition data. _American Journal of Physical Anthropology_ 51: 203-212.

Stini, W. A.
1971 Evolutionary implication of changing nutritional patterns in a human population. _American Anthropologist_ 73: 1019-1030.

Taylor, W. W.
1968 _A study of archaeology_. Southern Illinois University Press. Fetter & Son, Inc.

Wedel, W.
1943 Archaeological investigations in Platte and Clay counties, Missouri. _U. S. National Museum Bulletin_ 183.

Weiss, K.
1973 Demographic models for anthropology. _Society for American Archaeology Memoirs_ 27.

Willey, G.
1966 _An introduction to American archaeology, vol. 1: North and Middle America_. Prentice-Hall, Englewood Cliffs, New Jersey.

Willey, G. and P. Phillips
1958 _Method and theory in American archaeology_. University of Chicago Press, Chicago.

Wood, W. R.
1961 The Pomme de Terre Reservoir in western Missouri prehistory. _The Missouri Archaeologist_ 23: 1-131.

1967 The Fristoe burial complex of southwestern Missouri. _The Missouri Archaeologist_ 29.

PART V

CHAPTER 2

THE PREHISTORY OF THE OZARK-PRAIRIE BORDER: A SYNTHESIS, 1983

by

Donna C. Roper

INTRODUCTION

The study approach for the mitigation efforts described in this report is outlined in the scope-of-work for contract DACW41-77-C-0132. The basic goal of the study was specified as culture-history, including the specific objectives of history of the natural environment and resource exploitation, settlement and population history, socio-economic reconstructions for each definable time period, and explanations for cultural dynamics of the local sequence. Minimal study topics included the culture history of the Dalton and Middle Archaic complexes, with emphasis on settlement patterns, and the culture history and settlement patterns of the Woodland and later peoples.

Three themes for orienting the project's field and analysis strategy were developed from these topics. The first of the three themes was a continuation of efforts to specify the cultural sequence and strengthen the prehistoric chronology of the Ozark-Prairie border area. This would include the identification of "type fossils" for the area, the specification of various cultural complexes and their relative temporal positions, and, when possible, the determination of absolute dates for this material. In many ways this theme of chronology became one of priority, for it is difficult to explore cultural dynamics in the absence of some way to measure the tempo of change or continuity.

The second theme was the study of settlement patterns and settlement systems in the western Ozark Highland and adjacent Western Prairie. The establishment of this theme was a continuation of research objectives defined in 1975, viz., the establishment of the position of Rodgers Shelter in the Pomme de Terre valley and the Osage basin, western Missouri, and the eastern United States in general (Roper and Wood 1975). The

seeming emphasis on Rodgers Shelter and the Pomme de Terre River was simply a recognition of their status as the best known parts of the reservoir, the intensive study (Wood and McMillan 1976) that had preceeded the Corps of Engineers funded work in the reservoir as a whole, and therefore their function as a sort of baseline. It also recognized, however, that no matter how well studied a particular site is, it cannot serve as the sole source of data for the examination of regional trends.

The third theme was the demonstration and explanation of cultural continuity and conservatism in the Ozarks. This theme has run through the literature of Ozark prehistory and sociology for several decades. Minimal attempts to explain it have been made, however.

The work conducted in the Truman Reservoir under this contract has, in fact, made important gains in all three problem areas. The projectile point analysis for the cultural resources survey emphasized the point that chronologies cannot be built from surface collected material alone (Roper and Piontkowski 1983) but also that a more detailed comparison of the Truman Reservoir material with published material from outside the reservoir might help in identifying cultural complexes present. The examination of projectile points, in particular, has therefore attempted broader and more intensive comparison with published material from throughout the eastern woodlands and the plains. The field investigations have also shown that stratified sites are present in some number on the Holocene terrace and can provide important stratigraphic information for placing these and other forms in sequences within the study area.

Obtaining absolute chronological data has been more difficult. All possible radiocarbon datable samples were collected, but when it came time to process the samples, it was possible to submit only 9 samples from 4 sites. Two of these were still insufficient for dating, one date was modern, and another was far too recent for the material - probably as a result of a small amount of contamination in a small sample, and a fifth sample could provide only an indicator date (which does, however, seem a reliable indicator). The scanty radiocarbon sequence had been anticipated and was therefore supplemented by a rather extensive series of thermoluminescence (TL) dates. The combination of intensive comparative studies, investigations of stratified sequences, and absolute dating, particularly TL dating, have provided a greatly improved understanding of the culture-history of the region.

The investigations have also produced a better understanding of regional settlement systems. This understanding is expressed in several ways. One is that repeated sampling across the reservoir has consistently documented differential site densities

in the several physiographic regions definable within the study area and also documented repeated patterns of association of various types of sites with various landforms within these regions.

A second documented level of settlement variability is differential distribution of cultural complexes across the landscape. The development of a synthesis of the prehistory of the Truman Reservoir area, however, must include an account of potential differential site preservation factors.

Finally, settlement variability is expressed by intra-site variation. This has been much more difficult to evaluate. Many sites in the reservoir are multicomponent and confined to the surface or plowzone. While useful information can of course be extracted from such sites, intra-site structure does usually not fall within this category. Further, it has been argued in the case of several sites (most notably 23BE660 and 23BE337, but the same arguements could probably also be developed at other sites) that post-depositional factors including several forms of pedoturbation (Wood and Johnson 1978) have reduced the primacy of the associations within sites (Butzer 1982: esp. Ch. 7 has an extensive discussion of site destruction processes). Nevertheless, gross size, particularly of the available single component surface sites, and gross contents serve as general indicators of site function.

The documentation and explanation of cultural conservatism in the region has also advanced as a result of the Truman Reservoir investigations. The synthesis to be presented below will document the cultural sequence in the Truman Reservoir area. It will show that for many millennia, into that period coinciding with the Hypsithermal climatic interval, the occupation of the Truman Reservoir can readily be accounted for using models of broad trends and traditions in the eastern United States or at least midwestern United States. It is following this episode and the subsequent establishment of a climatic regime that King (1980:11) refers to as a climatic regime of its own, that the Truman area appears as a non-participant in the cultural developments of the broader prairie peninsula region. Some of the available chronometric evidence shows the region was in fact occupied during the successive cultural florescences associated with the Late Archaic, Middle Woodland, and Mississippian periods and diagnostic artifacts suggest an awareness of or interaction with these developments. Yet none of these manifestations appear full-blown - at best they are attenuated or reinterpreted, often they appear ignored. A brief outline of a possible explanation is described in the first chapter of this report. A fuller development and exposition of the model is presented in this synthesis. This model appears to accomodate not only the conservatism of the post-Hypsithermal occupations, but also the less conservative earlier occupations, and the counterpart developments in other areas of the midwest.

CULTURE-HISTORY

The Temporal Framework

The archeological investigations conducted within the Harry S. Truman Reservoir have always been conducted within the framework of the traditional eastern U.S. chronology. That framework is here retained to facilitate communication, but is subordinated to a broader superstructure. A consideration of cultural trends in the western Ozark Highland and adjacent eastern edge of the Western Prairie suggests that four superaperiods will exhaustively and parsimoniously account for the archeological remains and the trends reflected by those remains. Each supraperiod comprises at least one, but usually more, of the customary periods of eastern U.S. prehistory. Each also correlates with a major environmental regime and is named for that regime.

The first supraperiod is designated the Late Glacial and encompasses the putative pre-Paleo-Indian period and the Paleo-Indian period. Its beginning is unspecified; its end may be placed around 10,500 years ago. This supraperiod is continent-wide, but almost entirely unrepresented in the Truman area.

The second supraperiod is the Early Post-Glacial. The Dalton and Early Archaic periods are assigned to this supraperiod. Dalton is always problematic. Some (e.g., Morse 1977) consider it Paleo-Indian, others (e.g., Tuck 1974) consider it Early Archaic. C. Chapman's (1975) synthesis of Missouri archeology simply considers it a period unto itself and this separateness has been maintained throughout the Truman Reservoir investigations. It is clearly post-glacial, however, and its grouping here with the Early Archaic into an Early Post-Glacial supraperiod should be unambiguous. More importantly, however, the trends in the study area during this period are similar to those of the Early Archaic. The Truman area is occupied during this supraperiod. Much of the material assigned to it shows strong stylistic commonalities with material from the southeastern United States. Plano Tradition materials, stylistically reflective of materials from the High Plains also appear in small quantity. Dates assigned to this supraperiod are 10,500 to roughly 8000 B.P.

The Hypsithermal is the third supraperiod used here, although it contains only a single customary period. The Hypsithermal has long been equated with the Middle Archaic and present usage retains this equation. Its temporal parameters of 8000 to 4000 or 5000 B.P. may be somewhat longer than usually assigned, but it will be shown that cultural and adaptive trends of this interval exhibit sufficient continuity to warrent their consideration as an aggregate. Material assigned

to this interval also represents a stylistic continuity with areas outside the study area; however, this stylistic continuum represents a smaller geographic area which is coterminous with the Midwest or southern Prairie Peninsula. In the model to be presented here, this period is critical for understanding why the Ozark Highland area, which seems to participate in the major trends in the prairie border region does not continue to do so during subsequent periods.

The Hypsithermal is succeeded, logically enough, by the Post-Hypsithermal. The Late Archaic, Woodland, Mississippian and Historic manifestations all are subsumed by this supraperiod. It began at least 4000 years ago or possible earlier and has not yet ended. Some material assigned to this supraperiod bears some stylistic simularity to external Midwestern materials. However, it is during this period that the Ozark region establishes its own identity and appears "peripheral" or "marginal" to or "isolated from" the developments in the Midwest; or, less judgementally, simply shows a marked degree of cultural continuity and conservatism.

Figure 2.1 summarizes these supraperiods and the cultural periods subsumed under each. The major cultural complexes recognized in the Truman Reservoir are also shown.

The Evidence

LATE GLACIAL (? - 10,500 B.P.)

The earliest supraperiod has been designated the Late Glacial and corresponds with the last stages of the Pleistocene and the transition to modern Holocene environments. A beginning date has not been assigned, but the environmental record for the western Ozark Highland has been reconstructed for the last 50,000 years (King 1973; King and Lindsay 1976; Saunders 1977, 1983). It shows a mid-Wisconsin interstade open pine-parkland giving way about 24,000 years ago to a full-glacial spruce forest (King 1973:561; King and Lindsay 1976:75) inhabited by mastodon, horse, tapir, giant beaver, and other fauna (Saunders 1977, 1983). Deciduous elements began to invade the spruce forest about 16,500 B.P. (King 1973:562) and the transition to deciduous forest was complete about 12,000 B.P. (King and Lindsay 1976:77). This deciduous forest was dominated by oak and hickory and was probably more mesic than that which followed the Hypsithermal (King 1980:10). The supraperiod has been extended into the period of the deciduous forest for about one and a half millennia on purely cultural grounds. It recognizes that although boreal forest had retreated from the western Ozark Highland and indeed the southeastern United States (Whitehead 1965, 1973) in general, that regions to the north were still experiencing glacial and periglacial environmental regimes and that the archeological record of much of the eastern United States reflects occupation by peoples adapted to glacial related environments.

FIGURE NOT AVAILABLE

Figure 2.1

When human populations first entered North America is controversial. The earliest generally accepted dates still are scarcely older than about 12,000 years ago and are associated with fluted lanceolate points. The identification of an early occupation of North America, variously known as pre-paleo-Indian, pre-Clovis, or pre-Llano, has yet to be made to the satisfaction of many investigators. Nevertheless, the evidence from sites such as Dutton, Selby, and Lamb Spring in Colorado (Standford 1979; Stanford, Wedel, and Scott 1981), Shriver in Missouri (Reagan, et al. 1978; Rowlett 1981), and above all Meadowcroft in Pennsylvania (Carlisle and Adovasio 1982) has been sufficiently publicized and accepted by just enough archeologists that it has become practically de rigueur to include mention of it in archeological reports. It can be quickly disposed of in the present instance, however.

Investigations in Ozark Pleistocene springs were begun in the 1960's in part to evaluate Koch's (1857) contention that humanly manufactured artifacts were associated with mastodon remains at a spring now referred to as Koch Spring on the Pomme de Terre River (Wood 1976:97). Six springs spanning the interval from about 50,000 to 13,500 years ago were investigated (Saunders 1977, 1983) and none of them, even the terminal Pleistocene Boney Spring (which dates between 16,500 and 13,500 B.P.) yielded cultural remains associated with mastodon or any other species. No other material that could be assigned or argued to be assigned to this period was found in another context in the reservoir during the course of the extensive investigations in the area.

Evidence of occupation by Paleo-Indian peoples is scarcely better, however. The first chapter of this report described the body of evidence for Paleo-Indian occupation available in 1977. It consisted of a single fluted specimen in each of Benton, Cedar, and St. Clair counties, and none in either Henry or Hickory counties (C. Chapman 1975:67). It further noted that few fluted points had been recorded in any county of the Ozarks, either in Missouri (C. Chapman 1975:67) or Arkansas (Davis 1967, Newton 1977) and that even fewer have been recorded on the fringe of the Plains. The reason for this scarceness has never been clear. The intensive surveys of 1975 to 1979 in the Truman Reservoir covered both uplands and bottomlands throughout the reservoir. Yet they recovered only a single specimen that might be assignable to this period. The virtual absence of Paleo-Indian materials in the study area therefore seems real and not a product of lack of survey.

A single specimen was recorded, however. The point lacks flutes, but otherwise has all the characteristics of a Clovis point. Its cross-section is lenticular, the base and lateral haft margins are ground, flaking is parallel, and the basal concavity is deep and complexly curved. It has been fully described and compared with published samples of Clovis points by Roper (1981). The specimen was found on a multicomponent

site on which the deposits are entirely confined to the plowzone. It is therefore impossible to identify any associations of this point and other materials at the site.

EARLY POST-GLACIAL (10,500 - 8000 B.P.)

It has already been noted that a mesic oak-hickory forest was established in the western Ozark Highland by 12,000 B.P. King (1980:10) has interpreted pollen evidence from several sites in Kansas, Illinois, and Missouri (although not in the Truman area where a Holocene pollen record is almost entirely lacking) as representing a drying and possibly warming during the early Holocene. This drying was such that by 8700 B.P. drought related stress was evident and vegetational change was occurring along the southern prairie/forest border.

The archeological record of much of the southeastern United States in particular reflects a succession of wide-spread stylistic horizons during the period 10,500 to 8000 B.P. The archeological record of the Truman area apparently reflects a participation in these commonalities with some apparent interaction with complexes identified with the Southern Plains. The southeast during this period was similarly experiencing a series of post-glacial shifts in vegetation. The nature and chronology of the shifts of course varies both with latitude and altitude, but in general, the sequence would be similar to that summarized by Goodyear et al. (1979) and Cable (1982) from pollen studies throughout the southeast.

Boreal forests had left the area perhaps only slightly sooner than they left the Truman area. For example, Watts (1980:192) places the end of the pine/spruce forest at about 12,810 B.P. at White Pond, South Carolina and Whitehead (1973: 626) places it at about 11,000 at Rockyhock Bay, North Carolina. At both locations, and others as well, the boreal forest was replaced by a northern hardwoods association of beech, sugar maple, hemlock, birch, and other species (Watts 1980; Whitehead 1965, 1973). This association in turn was replaced by an oak-hickory forest and only later by an oak-pine forest. The transition to oak-hickory appears to have been completed by 9500 B.P. at White Pond (Watts 1980:194). This same period is associated with a peaking of the northern hardwoods forest in southeastern Virginia and the beginning of the establishment of the oak-hickory forest, a transition completed by 8300 B.P. (Whitehead 1965:428). It is clear that oak-hickory forests prevailed in much of the southeast and in the Truman area during the supraperiod we are here referring to as the Early Post-Glacial.

The earliest of the stylistic commonalities recognized in the eastern United States corresponds with that complex which is the earliest well-represented in the Truman area. This is

the Dalton horizon, named for the point which is named for the collector who supplied the information on the first recognized specimens from a site near the mouth of the Osage River (C. Chapman 1975). Dalton material has long been known from Rodgers Shelter (e.g., Wood and McMillan 1967) as well as from open sites in the Truman and surrounding area (e.g., Wood 1957). The major diagnostic style is the classic Dalton or Dalton Serrated (C. Chapman 1975:245-246) point. This horizon appears to also be represented in collections from open sites by several associated froms including artifacts strongly reminiscent of the Hardaway Side-Notched and Hardaway Blade or Hardaway Dalton form described by Coe (1964:64-67) from the Hardaway site in piedmont North Carolina.

Dalton material is found throughout the southeastern United States (Tuck 1974:73) although it is scarce on the eastern Atlantic Coastal Plain (Williams and Stoltman 1965:672). It is present throughout Missouri, but is more common in the southern two-thirds of the state. C. Chapman (1975:99) remarks that very little of this material is present in the Western Prairie Region. The Truman Reservoir surveys have now recorded Dalton remains from that region, but it is the case that the Truman study area penetrates only the eastern edge of the Western Prairies.

The Dalton chronology in the Truman area remains sketchy and limited to the two dates of 10,530±330 B.P. and 10,200±330 B.P. from Rodgers Shelter (McMillan 1971:81). A date of 9800 B.P. was obtained on a geologic sample below the Dalton horizon at the Montgomery site in Cedar County (Collins et al. 1983). No samples sufficient for dating or in demonstrated association could be obtained from the sites investigated during the course of this project. Heat treatment is not characteristic of Dalton points, thus precluding the possibility of directly TL dating the specimens themselves.

Probably contemporary with Dalton in the Truman area are some sparse materials relatable to the Plano Tradition, or late Paleo-Indian that persisted on the Plains essentially until the full onset of the Hypsithermal. The major representative of this tradition is the Plainview point which appears in small quantity and almost invariably on sites at which Dalton material is also present. Occasional Scottsbluff points are recorded (e.g., Wood 1957; Collins et al. 1983) but none were found during the present study, nor are the later Plano forms (Agate Basin, Hell Gap, Alberta, etc.) represented.

None of the Plainview material could be dated either directly or by associated material; again, heat treatment is not characteristic and TL dating of the specimens could not be used. Plainview points are regarded as contemporary with Dalton dates from the southeast (Figure 2.2).

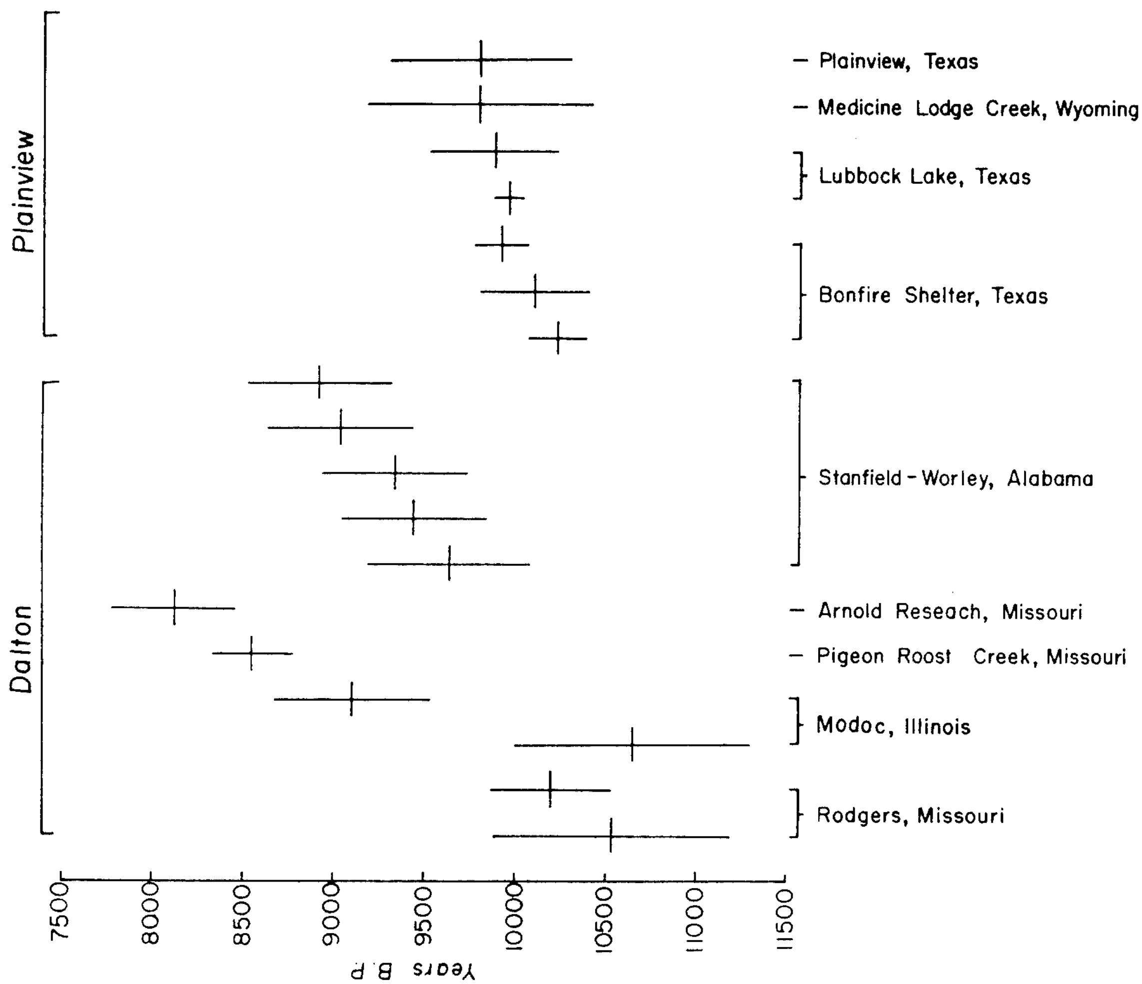


Figure 2.2

Dalton and Plainview Radiocarbon Dates from the Southeastern and Plains Regions

Goodyear (1982) has recently rejected the associations of Dalton points with the cited radiocarbon dates at Stanfield-Worley Shelter, Arnold Research Cave, and Graham Cave (he does not discuss Modoc) on the basis of disturbance of the deposits and uncertain association and has accepted only the Rodgers Shelter dates as correctly associated with Dalton materials. He furthermore argues that since Dalton is never unambiguously mixed with later Palmer and Kirk materials that are well dated nor with fluted points, that the Paleo-Indian dates on the one hand and the Palmer and Kirk dates one the other bracket the age of Dalton as between 10,500 and 9900 B.P., an interval that neatly accomodates the two Rodgers Shelter dates. In light of the frequent association of Dalton and Plainview materials in the Truman area it is perhaps significant that the Plainview materials also fall within this 600 year interval. Johnson and Holliday (1980:104) accept only the dates from the Lubbock Lake Site and Bonfire Shelter in Texas as actually pertaining to Plainview materials. Averaged dates (using procedures outlined by Long and Rippeteau 1974:206-210) for the two sites are 9956±78 and 10,069±103, respectively. Using t-tests of contemporaneity (Long and Rippeteau 1974:210-211), the probabilities of Lubbock Lake and Bonfire Shelter being coeval with Rodgers are .15 and .77, respectively. While many more dates are needed for both Dalton and Plainview materials, in the absence of any evidence to the contrary, the Dalton and Plainview materials in the Truman collections are presumed to be consistent with these dated sites.

The Kirk horizon (or tradition (Tuck 1974)) is also identified in the Truman area with some confidence. It is represented in the area and indeed in the broader region of the Ozarks by the Rice Lobed point, named by Bray (1956:128) for specimens at the Rice Shelter in Stone County, Missouri. C. Chapman (1975:254) in describing the type has noted the similarity to Kirk Corner-Notched points. They are common throughout the Ozark region (e.g., Bray 1956, Roberts 1965).

Rice Lobed points were identified in the collections from five sites recorded during the Stage 3 and Public Use Area surveys. They are not described in the report of the cultural resources survey (Roper and Piontkowski 1979) but were almost certainly present and not recognized in that collection. A few specimens occur at Rodgers Shelter (Kay 1982:444-445).

This local equivalent of Kirk is completely undated in the Truman Reservoir, except by interpolation at Rodgers Shelter. Here, their modal occurrence is in a unit projected to date between 9500 and 8600 B.P. No other specimens have been found in stratigraphic context in the reservoir. Dating must therefore rely on cross-dating.

Kirk Corner-Notched points are in fact rather well and tightly dated in the southeast. The longest series is from the

the Ozark Highland (e.g., Bray 1956, Roberts 1965) and occurs in some quantity in the lower horizons at Rodgers Shelter (Kay 1982). It has been found in extremely small quantity in the collections from the approximately 2000 sites recorded by the University of Missouri between 1975 and 1979.

Graham Cave Side-Notched points are problematical. Side-notched specimens are present in some quantity in the collections and include specimens classifiable as Graham Cave. These points are presumed to be Early Archaic at Graham Cave, Arnold Research Cave, Tick Creek Cave, Modoc Rock Shelter and other sites (C. Chapman 1975:127-157) but they have yet to be dated in an unambiguous unmixed deposit. They occasionally occur with other Early Archaic forms at open sites, but even more frequently they are either alone or with side-notched specimens more clearly assignable to the Hypsithermal interval occupations.

It is interesting to note that the still poorly studied but collector-prized presumably Early Archaic styles such as Thebes, St. Charles, and Hardin are almost entirely absent, the possible exceptions being one or two specimens that have been called Hardin although they are not completely typical. These styles are very common in the Missouri, Mississippi, and Illinois River valleys and the valleys of some of their major tributaries.

The amount of Early Post-Glacial age material in the Truman collections is not large, Dalton being the best represented of the complexes described. Nevertheless, there is sufficient material to establish the essential identity of the area with the regional trends of the southeastern rather than midwestern United States. Comparative material from sites and surveys throughout the Ozarks suggests that a sampling accident has not occurred.

HYPSITHERMAL (8000-5000 or 4000 B.P.)

The effects of the Hypsithermal were probably being felt in the Truman area even before the last of the Early Archaic traditions (i.e., the bifurcate base) had ended, or at least before it had ended farther to the east. Unfortunately, no Holocene pollen record is available for the Truman area. The dates for the onset of the Hypsithermal in the western Ozarks are bracketed by records to the west and east. The Muscotah Marsh, Kansas pollen record indicates the advance of the prairie and a change to a warmer/drier climate by 9900 B.P. (Gruger 1973). Similarly, the Old Field in the Mississippi Valley in southeast Missouri reflects a decrease in water levels and an increase in species characteristic of drier localities by 8700 B.P. (King and Allen 1977). Presumably, then, the Truman area was experiencing warmer and/or drier conditions by sometime in the late ninth millennium B.C.

The effects of the Hypsithermal on human populations is a matter of considerable interest in North America. Some, such as Benedict (1978), have considered the effects to be major, causing extensive population movement throughout North America and driving people to high-altitude refugia in the better-watered Rocky Mountains. Many would not agree with Benedict's position, but the fact is that local population movements and abandonments have been postulated as responses to drought in various places in North America. One of these places is in the western Ozark Highland. Horizon 4 (Stratum 3) at Rodgers Shelter is dated to the latter part of the Hypsithermal (5200-3600 B.P. Kay 1982:103); this represents a revision of the previously published 6300-3000 B.P. McMillan 1976:213) and has very little evidence of occupation. It has long been a goal of investigations in Truman Reservoir to establish whether it was Rodgers only or the entire area that was abandoned during the Hypsithermal.

Several artifact complexes in the Truman collections are inferred to date to this period. The most prominent among these are the flared base and side-notched point groups.

Flared base points are perhaps not numerous in absolute terms, but their numbers are somewhat larger than are frequencies of specimens from the preceeding periods. The type designation Jakie Stemmed pertains to this category of artifacts.

Dating the flared base points is difficult. C. Chapman (1975:251) considers them to date between 7000 and 5000 B.P., based in part on dates of 7070±450 B.P. and 6280±400 B.P. (C. Chapman 1975:237) at Jakie Shelter in Barry County, Missouri. Jakie Stemmed points were also found in Horizons 8B and 8C and dated to about 7000 B.P. at the Koster site in Illinois (Brown et al. n.d.:13-14). Their modal occurrence at Rodgers Shelter is in Horizon 5, dated (by interpolation) to be between 6700 and 5200 B.P. A single date of 6300±590 B.P. was obtained from this horizon (Kay 1982). On the basis of these few dates, the flared base complex should perhaps be somewhat narrowed from the 2 millennium span assigned it by Chapman and considered to date between about 7100 and 6300 B.P.

Comparisons with sequences in other areas are also difficult. Flared base points are known throughout the Ozarks including at Tick Creek Cave (Roberts 1965), the Gasconde River valley in general (McMillan 1965), the Table Rock Reservoir area (Marshall 1958, Adams 1950), northeast Arkansas (Scholtz 1969) and in Delaware County, Oklahoma (Purrington 1971). Their presence at the Koster site shows an apparent extension beyond the Ozarks. The tradition nevertheless seems localized. It might be notable that Benedict's (1978) compilation of radiocarbon dates shows the prairie-plains area in general to be poorly dated in the 7000 to 6500 B.P. interval. He further suggests, using several lines of evidence, that this was the first of two

drought maxima associated with the Hypsithermal and that populations were seeking well-watered refugia during this interval. We will not go so far as to suggest that the Ozarks formed one such refugium, although it is an idea occasionally verbalized by students of the region; we will simply suggest here that the difficulty in placing the flared base point complex in perspective may be related to a lack of habitation in some of the adjacent regions.

The second of the Middle Archaic complexes in the Truman area is that represented by side-notched projectile points. In this respect, the Ozarks are similar to the mid-South, Midwest, and Central Plains, in all of which areas side-notched points are common during the Hypsithermal. Dating and relation of the Truman area material to these complexes is problematic, however.

Dates on side-notched point complexes in the prairie-plains area are available from a number of sites in Minnesota (Shay 1971), Iowa (Anderson, Shutler, and Wendland 1980:262-264), Nebraska, Missouri (Teter and Warren 1979:234), and Illinois (Fowler 1959:18; Cook 1976:70). The sites are readily divisible into two groups: the Minnesota-Iowa-Nebraska group, all of which are in the tall grass prairies, and the Missouri-Illinois group, all of which are at the forest-prairie border area. Plotting the dates as shown in Figure 2 . 3 produces the interesting observation that the side-notched points are much earlier in the west than in the east; in fact, the median date for the western series (7200 B.P.) is nearly 2000 years earlier than the median date for the western series (5370 B.P.). Truman is in a position ecologically far more similar to the eastern sites, but the Rodgers Shelter dates (Figure 2.3) from horizons with side-notched points in some quantity are of little help since they are some of the earliest as well as some of the latest dates.

True Graham Cave Side-Notched points, as described earlier, appear to be Early Archaic in age and it is in fact this style that is most closely associated with the earliest dates at Rodgers (Kay 1982:386). The smaller side-notched forms seem to be entirely lacking at Rodgers but occur in moderate abundance at open sites in the reservoir. These are most similar in appearance to the eastern forms that are so common at Koster, for example (Cook 1976). These forms are also common throughout the deciduous forest regions of Illinois (e.g., Winters 1963, Jefferies 1982) and into the mid-South (e.g., Lewis and Lewis 1961). It is our suspicion that much of the side-notched material at open sites in Truman Reservoir relates to this mid-South-Midwest tradition and is most properly placed in the period from about 6000 to 5200 years ago. Further investigations will be required to substantiate this claim.

Hypsithermal age material does occur in some quantity in the Truman Reservoir area. In fact, it is necessary to go all

FIGURE NOT AVAILABLE

Figure 2.3

the way back to the Dalton occupation to find a complex as well represented as the side-notched point material is. The commonalities with the entire southeastern region have ended, as they have in other places. Nevertheless, echoes of the mid-South (i.e., the plateau areas west of the Appalachians) are apparent in the Ozarks as they are in the physiographically and ecologically similar Shawnee Hills of southern Illinois. Interaction with the Plains seems less apparent, but the archeology of this period on the Central Plains is poorly known.

POST HYPSITHERMAL (5000-4000 B.P.-present)

The end of the Hypsithermal, like its beginning, was probably time-transgressive and when it occurred in the Truman area can again be approximately bracketed. Data from the Old Field suggest that warm or dry conditions prevailed until at least 5700 B.P. in that area (King and Allen 1977) while Muscotah Marsh does not reflect an amelioration until after 5100 B.P. (Gruger 1973). The Hypsithermal does not appear to have ended until even later in other prairie areas (King 1980: 11). King (1980:11) has suggested that pre-Hypsithermal conditions were not reestablished, when the Hypsithermal ended. Rather, a new climatic regime "...more mesic than the dry period that preceeded it but with less effective moisture than in the early Holocene" was established. It will be contended here that a new cultural regime, highly peculiar to the region also was established during this period.

It will be recalled that the post-Hypsithermal begins with the Late Archaic period. Two major traditions are represented in the Truman area at this time, one manifesting strong ties to northern Missouri and western Illinois, the other being a localized tradition.

The southern border of the Prairie Peninsula appears united in Late Archaic times by a stylistic horizon characterized by Wadlow, Etley, Sedalia, and Nebo Hill projectile points. These styles are differentially distributed across the prairie forest border, with Wadlow and Etley points but few Nebo Hill specimens in central Illinois (Cook 1976) and Nebo Hill and Sedalia points but fewer Etley and almost no Wadlow points in western Missouri (e.g., Reid 1980, 1983). The basal notched Smith points that occur in eastern Kansas (Schmits 1978) and at Phillips Spring (Kay 1982:658) and Stone Square Stemmed (C. Chapman 1975:257) points may also be related. All styles are characterized by massive flat, expanding flake scars used in their manufacture, large size and generally massive appearance, absence of heat treatment in manufacture, and the use of Burlington chert for tool manufacture.

Other than at Phillips Spring (Kay 1982), few dates are available in the Truman area for this material. A fairly large suite of dates is available from sites beyond the reservoir and the interval represented by these dates in long. Dates for

horizons containing Smith Basal-Notched points average 5163 B.P. at the Coffey site (Schmits 1978:85). Sedalia and Smith were recovered from horizons possibly dating to ca. 3000 B.P. at Phillips Spring (Kay 1982:632). Other dates for Titterington Phase material (Etley and Wadlow) are 3950± 75 B.P. at the Koster site on the Illinois River valley (Cook 1976:65) and 4050 B.P. (average of 6 dates) at the Go-Kart North site in the Mississippi River valley (Fortier 1983:244), both in Illinois. It is not certain, however, how the later materials relate to the earlier. It seems possible that a classic Titterington Phase in western Illinois and eastern Missouri is temporally restricted to a fairly short interval around 4000 B.P., but that reminiscent styles persist for perhaps a millennium.

That the Truman Reservoir area participated in this stylistic commonality is certain. Etley and Sedalia points are numerous in the collections, particularly those from sites in the eastern portion of the reservoir. Nebo Hill points also appear in small numbers and occur exclusively in Henry County.

Coeval with this stylistic continium but lasting considerably longer is a tradition initially characterized by Afton, Table Rock Stemmed, and a variety of other point styles. This tradition is peculiar to the Ozark region of southern Missouri, northern Arkansas, and northeastern Oklahoma and is here argued to represent the establishment of the cultural tradition that was to characterize the specific Truman area and most of the Ozark region in general throughout the remainder of prehistory.

This regional tradition was not without recognizable change. New projectile point styles were added, although old styles apparently persisted for some time. The introduction of the bow and arrow was one impetus for stylistic change. Ceramics were also added to the material culture inventory, although they were apparently never used in large quantity. The idea of mounded burial, locally reinterpreted from the construction of earth mounds to the construction of rock and earth cairns was also introduced. These innovations, the bow and arrow, ceramics, and mounded burial, unquestionably were stimulated by contacts with populations beyond the Ozarks and the contemporaneity of the introduction of the bow and arrow and mounded burial in particular with their introduction in the Prairie Peninsula in general should suggest that the Ozarks were not isolated from the flow of ideas in the broader Midwest.

It is only with difficulty that restricted cultural complexes can be isolated within the total aggregate of materials referrable to this tradition and the division into Late Archaic, and Early, Middle, and Late Woodland is not readily made. In fact, it would seem that the passage of time and the demarcation of these periods is indicated largely by the presence of intrusive material or distinctive artifacts marking some sort of contact between the Ozarks and other regions. The Titterington, Sedalia, and related material, here interpreted

as the last full participation of the Ozarks in the major midwestern cultural developments rather than as an intrusion or contact, is one such horizon marker.

The Late Archaic in the Prairie Peninsula was followed by a period (the Early Woodland) which is at present poorly known and for which the evidence is limited to several major waterways of the Midwest. Early Woodland materials in Missouri in general are limited and do not include the Ozarks (C. Chapman 1980:9-20). The way of life established during the Late Archaic undoubtedly continued here as in many parts of the midwest.

It is probably with the Middle Woodland that the impression of regional comservation first becomes apparent. To be sure some Hopewell (or Hopewellian) material is to be found in the Truman area. Some was identified at Blackwell Cave (Wood 1961: 102-104) a quarter century ago and additional material has been identified in ceramic collections from open sites and shelters elsewhere in the reservoir. These collections include not only pottery with Havana-like design motifs, but also an occasional cross-hatched rim. Curiously, much of the material observed is clustered in the Tebo Creek area. Kansas City Hopewell ceramics also appear in the ceramic assemblages from several rockshelters in the upper portions of the Osage River drainage in the study area, but such material is not common.

Probably the clearest indication of some sort of influence from the major valleys is the presence in fairly large numbers of projectile points which we have classed as Cooper and Snyders and which are morphologically familiar to anyone who has worked with Havana assemblages from Illinois. The implications of their presence are uncertain. Settlement evidence does not reflect any shift in the way of life from that established at least two millennia earlier. Whether the importance of this type represents an influx of bearers of the style (which seems unlikely), use by these bearers of the region for special purposes (which also seems unlikely given that most specimens are manufactured of local cherts), a shift in hafting techniques, or some other technological superiority is uncertain at present.

The Late Woodland may be the most distinct period in the area. A highly recognizable complex is represented by thick, limestone-tempered, smoothed or cord-marked, largely undecorated pottery, Rice Side-Notched and Scallorn projectile points, and the interment of the dead in rock and earth tumuli. This complex was long ago defined as the Lindley Focus and associated Fristoe Burial Complex of the Highland Aspect (Wood 1961:105-109) and bears some similarity to the Boone and Maramec Spring Foci of the central and eastern Missouri Ozarks (Denny 1964; McMillan 1965:57-67). Brock's analysis of the skeletal populations from the Fristoe burial mounds (Vol. III, Pt. I, No. 2) shows the age and sex distribution to be that expected of a normal population rather than a seasonally or functionally specific segment of a non-resident population.

Isolation of the Cooper-Synders and Lindley-Fristoe material in no way accounts for all the Woodland material in the area. The aggregates have been studied to attempt to isolate artifact styles that frequently co-occur and those whose occurrence is exclusive of other styles. The complex represented by contracting stemmed points (Gary, Langtry or Standlee) becomes obvious from such an analysis. It was clear even before the work conducted under this contract began that this material was separate from other Woodland complexes in the area (this volume, p. 23) and continued investigations continued to confirm the separateness of this material from other Woodland remains. It was also suggested that even the two major contracting stemmed forms, Gary and Langtry or Standlee, may represent separate complexes and the continued investigations also supported this separation. Ceramics are not associated with either complex and mortuary practices are unknown.

Complexes in which Gary points are a major diagnostic artifact are well-known in the Arkansas River drainage in eastern Oklahoma. They are particularly well represented in the Fourche Maline phase in the Ouchita Mountains but are known well to the north and east of the Fourche Maline core area. The Gary points in the Truman area do not represent the entire range of diversity known for Gary Points in extreme southwest Missouri and northeast Oklahoma. Their presence in the Truman area is almost certainly due to influence from the southwest.

The nature of the occupation is uncertain. Gary points were the predominant form at the Flycatcher site (23CE153) in the Stockton Reservoir area (Pangborn, Ward, and Wood 1971) where structural remains and features suggest a more than casual occupation. Similar components were not located in Truman Reservoir.

Standlee points are the numerically most common form in the collections. They too seem to appear without ceramics but in sites, such as the Cootie site (23BE676) that represent a more than casual occupation.

Separate from these complexes is a large aggregate of material within which projectile point categories may be defined (see Vol. II, Pt. I) but which are each represented by small numbers of specimens. Co-occurrence of these categories is essentially random, even in sites such as 23BE337 and 23HI297 at which controlled excavations were conducted. Ceramics do not appear to be associated with this material.

Several late prehistoric ceramic complexes whose major distributions are beyond the Truman area and not necessarily even within the same drainage are sparsely represented in the collections from rockshelters in the St. Clair County area of the Osage and Sac Rivers and their immediate drainages. That peoples associated with the Central Plains Tradition were enter-

ing the area is apparent from the finds of Steed-Kisker and Pomona ceramics. Wood (1968) has argued that the association of Steed-Kisker pottery and bison bone at the Vista shelter represents a hunting foray by these people who were based in what is now the Kansas City area (cf. O'Brien 1978). The Pomona material in Missouri has not yet been described in detail, but presumably represents a similar form of occupation. It should be noted that the presence of this material was recognized prior to the Stage III survey and excavations described in this report and open sites with similar material were deliberately sought. No additional sites, particularly open sites, were recorded.

To recapitulate, therefore, it is argued that following the close of the Hypsithermal, a way of life was established that was peculiar to the Ozark region and which persisted throughout the remainder of the prehistoric period. The Truman area is blessed with an abundance of chippable chert and remains of these peoples are also abundant. A study of them shows that several distinct complexes can be isolated, but that assignment to specific intervals of time is presently largely impractical.

SETTLEMENT DYNAMICS
A Model for Differential Site Preservation

Before examining site distribution across physiographic zones and landforms within zones, it is deemed advisable to present a model of the changing geomorphology of the Truman Reservoir area and its implications for site preservation. It will be shown that the geomorphic events of the late glacial, early post-glacial, and Hypsithermal have been of sufficient magnitude and of such a nature as to have potentially biased preservation and therefore to have important ramifications for an accurate interpretation of the archeological record. Most of the data used in developing this model are summarized from published materials on investigations in the Pomme de Terre River valley. The investigations in the wider Truman area have shown, however, that at least the major events are generalizable to the central Osage River basin as a whole.

The preservation model separately considers processes in the bottomlands and in the uplands. It then juxtaposes them with the archeological record and derives implications for site preservation and potential discovery. The model is summarized in Figure 2.4. It is appropriate to note here that the basic implications of the bottomland alluvial chronology for differential site preservation were noted by Johnson (1983:73-74) some time ago. The implications of hillslope erosion for preservation of sites in the uplands has also been briefly described by Roper (1981:315-316).

The bottomland sequence of the Pomme de Terre River has been so often summarized (e.g., Haynes 1976, 1983) as to scarcely bear repetition here. In general, however, the bottoms of all

FIGURE NOT AVAILABLE

Figure 2.4

major streams in the central Osage basin have not been stable during the period of human occupation. Prior to the first known occupation of the area, the rivers had built and subsequently abandoned three alluvial terraces - T-3, T-2, and T-1a (Haynes 1983). A major erosion interval then began sometime after 13,550 years ago. This episode lasted for nearly three millennia, ending sometime before 10,500 years ago. The terrace designated T-1b then began to form. Although this terrace was not abandoned until less than 1000 years ago, it formed at different rates during that time (Ahler 1976, Kay 1982) and was interrupted by lesser erosion intervals at least three times (Brackenridge n.d.: .9), the third ending with terrace abandonment.

Concurrent processes in the uplands are less straightforward to infer. The following discussion is drawn from Ahler (1976) and Kay's (1982) discussions of the stratigraphy at Rodgers Shelter and the contribution of upland materials to the Rodgers sediment (see also McMillan and Klippel 1981).

The lowest units at Rodgers were formed prior to 8100 B.P. (Kay 1982:84). While much of these lower sediments were the result of lateral and vertical accretion by the Pomme de Terre River, others (those near the bluff face) comprise a talus containing cobbles derived by frost and gravity from the bluff (Ahler 1976:134, Kay 1982:86). Above these units is another unit that, while primarily resulting from vertical accretion had these materials "derived from erosion and redeposition of weathered upland soils in the area" (Ahler 1976:135). The uppermost unit in the lower stratum of the shelter is suggested (Ahler 1976:136) to contain increasing amounts of dolomites and indicating increased exposure and erosion of the bedrock. The overlying stratum contains both alluvial sediments laid down by the river and alluvial from debris derived from the hillslope above the site (Ahler 1976: 136). The next unit also contains both alluvial and colluvial deposits. Ahler (1976:137) suggests a maximum in hillslope erosion during this period.

Overall, it appears that geomorphic processes affecting the uplands have varied through time and have depended upon a variety of factors, including: 1) severity of frost - i.e., temperature regime, 2) extent of vegetation cover, and 3) precipitation regime. In general, the studies at Rodgers Shelter have suggested that late glacial times were characterized by high precipitation and severe frost action with considerable weathering on the bluff and downhill transport via gravity. During the postglacial periods, precipitation rates remained high for a time but gradually decreased while vegetation cover also decreased. Greater surface runoff occurred, speeding downhill transport of loose materials and stripping hillslopes. This pattern continued for several millennia, with decreased precipitation and decreased vegetation cover, rendering slopes and upland surfaces subject to increased erosion and stripping.

The implication of these two sets of events for preservation of archeological sites is enormous. In the first place, there is little potential for preservation of Paleo-Indian sites. Rivers were eroding at this time and sites in the bottoms would have been flushed soon after deposition. Paleo-Indian sites in the uplands would have lasted somewhat longer, but could have been stripped during the subsequent periods of increased runoff and hillslope erosion.

The Early Post-Glacial cultures occupied the area during a time at which the rivers were aggrading rapidly. Remains deposited on the floodplain could have been scoured or buried. That the later frequently occurred is shown not only by the context of the early deposits at Rodgers Shelter but also by the presence of buried Dalton and Early Archaic sites at other places throughout the reservoir area. Sites in the uplands are not likely to be so well preserved. Like Paleo-Indian sites, they would have subsequent to erosion and stripping during subsequent periods of erosion.

Expectation for Hypsithermal age, i.e., Middle Archaic, sites would be approximately the same. An early (ca. 8100 - 7500 B.P.) erosion interval could have removed some sites deposited early during this period but in general, Middle Archaic sites could have been buried by alluvium. The open hillslopes were being actively eroded, however, and sites in these landforms were potentially stripped subsequent to deposition.

Preservation of Late Archaic and Woodland sites is posited under the differential preservation model to have been considerably better. River aggradation had slowed considerably but some sites could be expected to be buried at least shallowly. Sites 23BE660 and 23BE337 are examples of sites described in this report at which Late Archaic materials were positioned below plowzone depth (generally about 20-25 cm below surface). If the erosion interval from 3500 B.P. to 2300 B.P. is generalizable, however, a number of Late Archaic sites, and perhaps some older sites as well, could have been eroded.

Woodland sites would be expected on or very near the surface of the T-1b. However, it was during the Woodland period that the T-1b was abandoned and the modern T-0 began to form. Woodland material is potentially buried in this unit; in fact, Woodland artifacts were found buried to a depth of about 2 m in a test unit into the T-0 at 23BE337 and at the Kowetz (23BE1008) and Lotterer (23BE1010) sites in the downstream Truman area (Purrington 1980:81-89).

Both Late Archaic and Woodland sites (i.e., sites assignable to the Post-Hypsithermal supraperiod) should be well preserved in the uplands. Some contradictory evidence is derived from 23BE259 where Late Archaic remains in a fairly deeply buried alluvial context were interpreted as redeposited, possibly from the hillslope above the site. Whether or not this is a localized event is uncertain.

In summary then, it is unlikely that many Late Glacial sites will be found. Early Post-Glacial and Hypsithermal age sites are likely to be buried in the Holocene terrace (T-1b) but may well be confined to that situation. Some care should, however, be taken to ascertain that materials recovered from allvuial context are not redeposited. Hypsithermal sites should be most amenable to surface recovery. The major biases in recovery of these sites are likely to be that some Late Archaic sites could have been eroded or shallowly buried and some Late Woodland sites could be buried in the modern floodplain (T-0) sediments.

What is not known is how these processes might have operated differentially in different physiographic regions of the reservoir - particularly in the prairie areas of Henry and Vernon counties where valleys are considerably broader and valley walls are much less precipitous. The following discussion of settlement dynamics will assume (for lack of any reason not to) that processes were uniform throughout the reservoir area. A sharp lookout will be kept for differential distributions in the prairies that might signify a different preservation regime.

Settlement Patterns

LATE GLACIAL

No discussion of distribution across the reservoir, distribution across the landscape, or intra-site variability is possible for the Late Glacial supraperiod since only a single specimen that might be assigned to this period was collected. This fact is not terribly remarkable in itself. No material reasonably assigned to pre-Paleo-Indian was recorded, which is expected since the presence of pre-Paleo-Indian is not yet conclusively demonstrated in North America. It was also shown in the first chapter of this report that the Missouri and Arkansas Ozarks and all of Kansas have produced few fluted points. The model for differential site preservation also suggested that few Paleo-Indian remains would be found in the Truman area.

It is suggested that both light utilization by Paleo-Indians and potential alteration or destruction of virtually any surface on which remains could have been deposited are responsible for the paucity of Paleo-Indian materials in the Truman Reservoir. The differential preservation model (at least the upland component) is likely not applicable to either the less environmentally sensitive deeper Ozarks nor to the also less sensitive Central Plains. The scarcity of remains in the Truman area is consistent with and likely reflective of trends in the two major physiographic regions it borders. Most such remains as ever were present either in the bottomlands or uplands were likely subject to erosion.

It might be notable that the single Paleo-Indian specimen was collected from an upland context in Henry County. Valley walls and uplands in this area are considerably less precipitous than in the area from which data for the differential preservation model were derived. Upland erosion in Henry County could have been less severe, the point could have been fortuitously preserved, or it could be totally out of its original context.

EARLY POST-GLACIAL

Early Post-Glacial materials are more numerous and their distribution more appropriately examined. This examination is here accomplished by keeping separate the Dalton, Rice Lobed-Kirk, and bifurcate base materials, studying the distribution of each, and making comparisons where appropriate.

We start at the general level and first consider the distribution of sites of each complex and their distribution across the four major physiographic zones defined for this study (i.e., the Ozark, Transitional-primarily Ozark, Transitional-primarily prairie, and Prairie-see Volume I, Pt. 3, No. 1 for details). Table 2.1 presents the distribution of the 26 Dalton, 12 Rice Lobed, and 4 bifurcate base components identified in the reservoir.

TABLE 2.1

DISTRIBUTION OF EARLY POST-GLACIAL SITES
IN PHYSIOGRAPHIC ZONES

	Dalton	Rice Lobed	Bif Base
Ozark	10	10	3
Trn-Ozark	10	0	1
Trn-Prairie	1	1	0
Prairie	5	1	0

Two aspects of this distribution are of major interest. One is the decreasing amount of material associated with each complex, the other is its increasing restriction to areas that are considered to lie within the Ozarks rather than the prairies.

If the number of identified components are converted to sites per century, then the collections represent 4.3 Dalton sites per century for the period 10,500-9900 B.P. (Goodyear 1982:391), 1.3 Rice Lobed sites per century using the southeastern Kirk chronology of 9500-8600 B.P., and .6 bifurcate base sites per century using the southeastern chronology of 8900-8200 B.P. (J. Chapman 1976). Under the differential preservation model, sites of all these complexes should have fared roughly the same - i.e., upland sites could have been later subjected to erosion while bottomland sites would have been subject to burial. The conclusion might be drawn that the decline in site deposition rates is reflective of decreasing use of the area.

A comparison with overall environmental trends is highly informative, however. It will be remembered that the pollen record from Boney Spring suggests establishment of a mesic oak-hickory forest by about 12,000 B.P. (King and Lindsay 1976: 77) and that oak-hickory forest was similarly being established in the southeast during the same period. When prairie entered the Truman area is less certain, but is apparently bracketed by the dates of 9900 B.P. at Muscotah Marsh, 160 km to the north-west (Gruger 1973) and Old Field, 320 km to the southeast (King and Allen 1977). In other words, it was likely during period when the Kirk or, at latest, bifurcate base horizons dominated that the post-glacial warming or drying trend began to have important implications for vegetation distributions in the deciduous forest-adapted Early Archaic hunters. The marked decline in densities of sites could well represent a decreasing use of the area. If this is the case, then it may also be significant that the later complexes are almost exclusively restricted to the eastern edge of the study area which presumbably was somewhat less sensitive to prairie invasion.

At the next level of settlement analysis, we examine the distribution of Early Post-Glacial sites across the landscape, relating them to streams and landforms. The purpose is to look for biases that may have been introduced by differential preservation as well as to describe the settlement patterns.

The surface survey report (Vol. I, Pt. 3 No. 1) described the stream ranking employed the three categories of valley magnitude used throughout the analysis. The largest streams, including the Osage, South Grand, Pomme de Terre and Sac Rivers formed a single category (stream ranks 9-10). The next echelon (stream ranks 4-5) was represented by Tebo Creek, Salt Creek, Gallinipper Creek, Weaubleau Creek, and Deepwater Creek. All other streams ranked 1 to 3. Sites may then be related to the valley in which they lie (Table 2.2).

TABLE 2.2

DISTRIBUTION OF EARLY POST-GLACIAL SITES
BY VALLEY RANK

	1-3	4-5	9-10
Dalton	1	4	21
Rice Lobed	1	0	11
Bifurcate Base	0	0	4

The "preference" of Early Post-Glacial sites for the major valleys is overwhelming. It will be instructive to examine the distribution of sites on landforms before attempting to interpret the distribution in valleys, however.

Table 2.3 distributes the components of each complex by landforms within each physiographic region. The patterns are

revealing probably not so much of cultural trends as of differential preservation. Very few sites are found in the uplands and a number of the mid-slope sites are large, multicomponent scatters where the primacy of context is entirely uninterpretable. The majority of the sites are on or in terrace deposits. Given this fact, then, it is probably no wonder that they are mostly within the major valleys.

TABLE 2.3

DISTRIBUTION OF EARLY POST-GLACIAL SITES BY LANDFORM

a. Dalton Sites

	Terraces	Foot Slope	Mid-Slope	Upland
Ozark	7	1	2	0
Trn-Ozark	7	1	0	2
Trn-Prairie	0	0	1	0
Prairie	1	0	2	2

b. Rice Lobed

	Terraces	Mid-Slope
Ozark	7	2
Trn-Prairie	0	1
Prairie	0	1

c. Bifurcate Base

	Terraces	Foot Slope	Mid-Slope
Ozark	1	1	1
Trn-Ozark	1		

It is still necessary to decide if this observed distribution is the result of cultural selection or differential preservation. Unfortunately, there are few data to use to decide. The observed form of distribution is consistent with that expected under the differential preservation model, but this in itself does not decide the issue. An indication of bias might be a comparison with the Applachian and Piedmont provinces of the Carolinas and Virginia where Early Archaic sites are very common in the uplands (Goodyear, House, and Ackerly 1979:105; Gardner 1974:23; House and Ballenger 1976: 68; House and Wogaman 1978) as well as in river bottoms. The distribution of Early Archaic sites in the Osage Basin certainly does not parallel that in the southeast, but this too could be the result of either differential preservation or (for any of a number of reasons) of different settlement strategy enacted

in this area. Overall, it is felt that the potential effects of differential preservation are sufficiently severe that the issue cannot be resolved at the present time. It is suggested that intensive surveys in both bottomlands and uplands in less sensitive portions of the Ozarks could provide evidence, albeit circumstantial, on the Early Archaic use of the area.

The final level of settlement analysis is the intrasite level. Few data are available but those that are suggest that most occupations are similar to the small living surfaces characteristic of the Dalton occupation at Rodgers Shelter. Limited excavations in Dalton components at 23SR569 (Piontkowski 1977) and 23CE261 (Collins et al. 1983) both revealed charcoal flecks, flecks of burned earth, and debitage, but few tools other than projectile points, all distributed over a small area. Excavations at 23BE214 were somewhat more extensive and appear to reflect a similarly limited assemblage. Interpretation of this latter site is made difficult by the confinment of debris to the plowzone and its mixture with some later material.

Limited data for Rice Lobed and bifurcate base sites suggest a similar form of organization. Limited tests at 23SR567 (Piontkowski 1983) recovered a limited range of tools and a small quantity of debitage over an area no more than 8 to 10 m in diameter. Charcoal and burned earth flecks were also observed on the living surface. Two of the Rice Lobed points were recorded as isolated finds.

The form of Dalton settlement system in the Mississippi Valley - Ozark area has been vigorously debated by Morse (1973, 1975, 1977), Schiffer (1975a, b), and Price and Krakkar (1975). In essence the argument is as follows: Morse (1973) and Goodyear (1974) both believe that the river basins of the southeast Missouri-northeast Arkansas area (and others as well?) were each occupied by single family bands and will contain a single base camp and a number of butchering camps. Schiffer (1975a, b), however, believes that territories will be hexagonal and contain several kinds of base camps, but that isolated hunting camps will be below the threshold of archeological visibility. Price and Krakkar (1975) adopt elements of both models.

Essentially, the Truman data are able to shed no light at all on the subject. Certainly no base camp was recorded, unless it is the Montgomery Site, 23CE261, on the Sac River. All other components are limited. It is notable, however, that most Dalton points in the Truman collections were manufactured of local cherts.

Similarly, no evidence was produced of an Early Archaic base camp. It is perhaps debatable whether or not there should be such. Goodyear and others (e.g., Goodyear, House, and Ackerly 1979:33) postulate a habitation/base camp function for bottomland sites and an extraction/procurement function for

upland components. Others (e.g., Anderson and Schuldenrein (1983:205) hold that the Early Archaic economy in the southeast was characterized by high mobility, foraging, and low intersite variability. The Truman area sites are consistent with this model, although the small number of identified components and the paucity of available (and obtainable) data suggest that this interpretation be treated with appropriate caution.

HYPSITHERMAL

Sites with manifestation of Hypsithermal age occupation are known from throughout the reservoir area and are surprisingly well distributed throughout the various physiographic regions defined in the study area. Table 2.4 presents the distribution of sites of each complex within the four regions.

TABLE 2.4

DISTRIBUTION OF HYPSITHERMAL AGE SITES IN PHYSIOGRAPHIC ZONES

	Jakie Stemmed	Side-Notched
Ozark	5	21
Trn-Ozark	2	15
Trn-Prairie	1	1
Prairie	2	13

Sites with Jakie Stemmed points occur in small number but are found throughout the area. Sites with side-notched projectile points as the diagnostic style are clearly not only well represented in the study area as a whole, but are well-distributed throughout the reservoir. Both distributions contrast with the spatially more restricted Early Post-Glacial material.

Temporal parameters for each complex were earlier set at 7100 to 6300 B.P. for Jakie Stemmed flared base remains and 6000 to 5200 B.P. for side-notched materials. Converting the observed number of components into sites per century yields estimates of 1.25 Jakie Stemmed-flared base sites and 6.25 side-notched point sites per century. However, the latter figure would be somewhat liberal if some of the specimens were actually somewhat earlier Graham Cave points. Nevertheless, the figures are striking. The flared base complex sites do occur with greater frequency than do the bifurcate base point sites, in nearly equal density with the Rice Lobed-Kirk material, but in considerably smaller number than either Dalton or side-notched materials. Side-notched materials attain perhaps the highest per century frequency of any archeological manifestation recorded in the Truman area.

Turning to an examination of the distribution of sites across landforms and stream valleys, we first present the occurrence of Hypsithermal age sites in stream valleys (Table 2.5). The distribution is surprising. The side-notched

TABLE 2.5

DISTRIBUTION OF HYPSITHERMAL AGE SITES
BY VALLEY RANK

	1-3	4-5	9-10
Flared Base	5	1	4
Side-Notched	5	7	38

points are predominantly from sites in larger valleys, but half of the admittedly small number of flared base point sites are in the smallest valleys. This marks the first time in the study area that valleys of the smaller tributaries yield large proportions of remains.

Table 2.6 presents the distributions of the same sites on landforms. The flared base point sites continue to occur more frequently in the bottomlands than on higher elevations,

TABLE 2.6

DISTRIBUTION OF HYPSITHERMAL AGE SITES
BY LANDFORM

a. Flared Base

	Terraces	Foot Slope	Mid-Slope	Upland
Ozark	3	0	1	1
Trn-Ozark	1	1	0	0
Trn-Prairie	0	0	1	0
Prairie	2	0	0	0

b. Side-Notched

	Terraces	Foot Slope	Mid-Slope	Upland
Ozark	12	4	4	1
Trn-Ozark	9	2	0	4
Trn-Prairie	0	0	0	1
Prairie	5	3	3	2

but components with side-notched specimens do perhaps more frequently appear in landforms higher than the bottoms.

The results of these two distribution analyses do not necessarily conform to the expectations derived from the differential preservation model. That model states that Middle Archaic sites should have been subject to burial within the Holocene terrace and erosion on the higher landforms. The greater number of sites in the uplands may be partially related to the greater number of sites in smaller valleys, but the number of sites on higher landforms bordering major streams suggests that this does not completely account for the difference (Table 2.7).

Finally, we are unable at the present to offer much comment on the intrasite structure of Hypsithermal age components in

TABLE 2.7

DISTRIBUTION OF HYPSITHERMAL AGE SITES
BY STREAM VALLEY AND LANDFORM

	Landform			
Stream Valley	Terrace	Foot Slope	Mid-Slope	Upland
1-3	8	4	3	3
4-5	3	1	2	0
9-10	16	4	2	8

the study area. Some sites of this period are large multi-component sites at which the Middle Archaic component could not be separated. Other sites that are single component, or at least not known to be multicomponent, were not investigated since their topographic position often placed them outside the direct impact area.

POST HYPSITHERMAL

The resources available for completing this synthesis simply did not permit a complete coding and analysis of the data from hundreds of Post-Hypsithermal sites to even the detail presented for the Archaic sites. Until such time as such an analysis can be completed, the following discussion will serve as a preliminary statement of Late Archaic and Woodland settlement patterns.

Analysis of the Stage 1 and 2 survey data was conducted prior to beginning the State 3 and Public Use Area surveys (see Vol. I, Pt. II, No. 1). That analysis examined the distribution of post-Hypsithermal age sites in relation to physiographic zones, valley ranks, and landforms. It found sites to be apparently randomly distributed through all physiographic zones and valley ranks, and perhaps on landforms

as well. In other words, post-Hypsithermal sites can be found in just about any situation within the reservoir area. This conclusion certainly does not contradict the predictions of the differential preservation model, but neither does it suggest cultural preferences for location. It is clear that a finer-scale analysis will be necessary to more usefully describe the settlement patterns of the later inhabitants of the central Osage basin.

The analysis of the Stage 1 and 2 data also showed that the majority of sites were small, often covering less than 1/4 hectare. Excavation rarely produced evidence of features and never produced structural remains (although some false color infrared photographs taken at 23BE676 suggest that past molds may have been present but extremely difficult to detect). These two observations may be interpreted to suggest that adaptive strategies during this period featured a high degree of mobility with short term residence. It is also suggested that resources patches were widely spaced, but presented seasonally varying potentials (cf. this volume, pp. 88-94), thus producing a temporal clumping of resources. We might then expected a higher degree of mobility among foragers in such an environment (Wiens 1976:97-98). A more intense examination of locational data and assemblage composition would permit a more adequate appraisal of the nature of the use of the central Osage basin by foragers of the last several millennia.

CULTURAL DYNAMICS

This last section presents a model of the cultural dynamics of the prehistoric occupation of the Ozark-Prairie border region of the Osage River basin. This model considers trends in prehistory from the earliest documented occupation to the end of the prehistoric period. It gives particular attention to the last four thousand years, the period for which he most evidence is available and for which that evidence suggests a high degree of conservatism. The matter of explaining this conservatism is also considered.

THE DYNAMICS OF THE PREHISTORY OF THE CENTRAL OSAGE BASIN

The pre-Paleo-Indian and Paleo-Indian periods, here grouped into a Late Glacial supraperiod, are omitted from the discussion of cultural dynamics in the study area. Evidence for occupation during this period is exceedingly sparse, as it is throughout the Ozarks in general (C. Chapman 1975:67; Davis 1967: Newton 1977). Preservation bias is a potential problem during this period, but it is suspected that the paucity of material is actually reflective of sparse use of the area by the earliest inhabitants of North America. The reasons for this non-use of the area are unclear.

The consideration of cultural dynamics therefore begins with the Early Post-Glacial Dalton occupation. Dalton remains have been shown to be well represented throughout the reservoir area. In fact, if Goodyear's (1982) Dalton chronology is accepted and the intensity of occupation is measured as sites per century, the Dalton is the most intensive occupation until that by peoples using side-notched points about 4000 years later (Figure 2.5).

Dalton is generally considered to be a culture of the southeastern deciduous forests, i.e., the area south of the Prairie Peninsula. It is therefore, not surprising that the general Truman area marks the effective western limit of this complex. It has been shown in this report that Dalton materials are known from throughout the study area; survey in the ten-year floodpool recorded several additional Dalton specimens upstream in the Osage valley (Taylor 1982:205). Dalton is occasionally found in the Kansas City area (e.g., Martin 1976: 11; Reagan 1981:18-22) but is rare in the Plains of Kansas and Oklahoma. The border area nature of the study area may be further highlighted by the presence of a small amount of Plano Tradition material, largely Plainview points, in the collections.

Evidence from several sites, including Rodgers Shelter, suggests that the sites are small (spatially restricted, ephemeral camps). The nature of Dalton settlement patterns in the Ozarks and surrounding area has been vigorously debated and it was hoped that the investigations in the Truman area could provide a date to support one or another position. The undifferentiated nature of the sites that have been investigated provides data supportive of none of the arguements advanced in the surrounding areas.

Dalton occupation was followed by occupations related to at least two of the major stylistic horizons identified in the southeast during the Early Archaic period. These include the Kirk horizon, represented by its local variant, the Rice Lobed point, and the bifurcated base tradition, represented by several defined forms. This material is quite sparse, but is argued to, with the Dalton, represent the western limits of the broad stylistic commonalities of the interval between the close of the Pleistocene and the full onset of the Hypsithermal.

The effects of the Hypsithermal were most likely being felt in the central Osage drainage area even as the last of the Early Archaic occupations occurred. The trend during the Hypsithermal throughout the eastern United States was toward increased regionalization or localization of cultural complexes. It is certain that the cultures of the central Osage River area no longer manifested stylistic similarities to the general southeast. Similarities were rather expressed with sites from throughout the Ozarks and with portions of the Midwest, eastern Central Plains, and mid-South, and are manifested as two

FIGURE NOT AVAILABLE

Figure 2.5

sequential complexes: that represented by flared base points (Jakie Stemmed) and that represented by small side-notched dart points.

Before proceeding to a general discussion of Archaic cultural dynamics, this summary may be continued by noting that the close of the Hypsithermal was followed culturally by the presence of two complexes in the area. These include one (Titterington-Sedalia-Nebo Hill) marked by stylistic commonalities with the Prairie Peninsula area in Illinois, northern Missouri, and the bordering areas of Kansas and Iowa and a second cultural tradition that has been argued to represent the establishment of a distinctly regional way of life. It is this latter that, in part because of drastically reduced aggradation by the rivers and reduced stripping of hillslope deposits, is represented by the vast majority of the material in the collections and is that which has presented the strongest impression of cultural continuity or conservatism to archeologists studying the remains.

This capsule summary raises a number of questions beyond the one that began the study: why is the impression strong of cultural continuity? It is also important to ask why the area bears strong evidence of participation in wide area trends up until shortly after the close of the Hypsithermal and then begins a trend of intense localization and lack of participation in the cultural developments of the immediately adjacent area. The answer that regional traditions are present throughout the east during this period is an answer that explains nothing.

The answer to why the earliest (i.e., Dalton and Early Archaic) occupations are apparently a part of the traditions in the southeast may have something to do with the biota of each region. Boreal forest retreat in the southeast was followed by establishment of northern hardwoods which then gave way to an oak-hickory forest which would have prevailed during the Early Post-Glacial period. The Ozarks presumably also were covered by oak-hickory forest. Certainly the similarity or potential similarity of resource availability does not imply that cultural manifestations must also be similar. However, it does imply that the resource mix and procurement strategies employed by Early Post-Glacial hunter-gatherers in the southeast could have been viable in the Ozarks.

The function of the Ozark sites and relation to the Southeast is entirely unknown at this time. Local raw materials used in tool manufacture would argue against occasional long-distance forays. On the other hand, the paucity and emphemeral nature of known sites might suggest that either the record is very biased or perhaps that the area used by these hunter-gatherers was large indeed.

It was suggested in an earlier portion of this chapter that the central Osage basin was occupied during the Hypsithermal climatic episode. Similarities are with materials from a broad

area of the Midwest, but not nearly so broad an area as the Early Archaic materials. The climate and environment presumably also reached a point at which it was quite different from the earlier period. The evidence, summarized earlier, suggests that hillslopes were considerably more open than they had been. Indeed, resource diversity in general was probably relatively high and zonation should have been well-marked; that is the distribution of resources should have been more strongly differentiated than prior to the Hypsithermal. In fact, it is argued that diversity and differentiation were at their maximum at this time. Various writers (Caldwell 1958, Cleland 1976) have suggested that it was also at this time that important subsistence changes occurred on a broad scale, that the resource base was broadened and greater use was made of the products of the deciduous forest.

The mechanisms of this change are unstudied. Presumably, however, the optimal diet would include a different and probably more diverse mix of foods than prior to the extinction of large game and the shift in resource potential during the Hypsithermal. The changed diet would have necessitated changed mobility strategies. The spatially and seasonably (cf. Part I, Chapter 2, this report) aggregated resources would have been best exploited by the dispersion of the population into habitation loci from which various extraction forays were sent. The apparent shift to a base camp function at Rodgers Shelter (McMillan 1976:224) is consistent with this expectation.

A similar reduction in mobility appears at Koster (Carlson 1979; Brown and Vierra 1983), Napoleon Hollow (Wiant, Hajic, and Styles 1983) and Modec Rock Shelter (Styles, Ahler, and Fowler 1983), Illinois. This trend is entirely consistent with the expectation.

Unfortunately, we know rather little of Middle Archaic (or Hypsithermal) cultural dynamics in the Osage basin beyond the evidence from Rodgers Shelter. The evidence for the presence of populations is strong but the number of known sites in good context is low.

The Hypsithermal interval eventually ended; moisture increased, the hillslopes above Rodgers Shelter were more closed than during the preceeding several millennia, and conditions were established that were closer to those at present. We suggest that this change was critical for life in the Ozark Highland. The resource potential of the Truman area was shown in Part I, Chapter 2 of this report to have been considerably lower than in other valleys of the Midwest riverine region. The patchiness of the environmental mosaic would have been considerably altered. This probably had profound consequences for hunter-gatherer subsistence. The lowered productivity would have permitted only small population aggregates and the widely spaced zones would have required a fairly high

degree of mobility to procure sufficient quantities of resources. Thus, it is suggested that mobility would have increased once again in the Ozarks, while the opposite trend was occurring in major river valleys of the Midwest (e.g., the Missouri, Mississippi, and Illinois).

It is probably no accident that the first cultigens appear in the Ozarks at this time. The squash remains at Phillips Spring are associated with an intense base camp site of the Sedalia phase (Kay 1982). However, this phase represents the last full participation of the Ozark populations in the major cultural trends of the Midwest. The use of cultigens can then perhaps be seen as an attempt to artifically maintain the resource diversity that had supported the more sedentary Middle Archaic populations. The experiment failed, however, and the more specifically regional tradition with its higher degree of mobility and distinctly local artifact styles became the dominant way of life in the central Osage River basin.

The local tradition persisted throughout the remainder of the prehistoric period. It was largely unaffected by major changes in the Midwest region, including the Havana-Hopewell and Mississippian cultural climaxes. It was not unaware of these developments, as evidenced by the adoption of such traits as the bow and arrow, ceramics, and mounded burial. Only during the Late Woodland period does any evidence once again suggest a possible decrease in mobility. The presence of sites such as 23HI297, with fairly high debris density and suggestions of features and midden, and sites like Dryocopus and Flycatcher on the Sac River (Calabrese, Pangborn, and Young 1969) may be evidence that the reintroduction of cultigens produced a change in spatial and temporal resource availability, permitting some reduction in mobility. Soils suitable for agriculture were extremely limited, being confined to the narrow valleys and the productivity of the wild resources that supplemented the cultigens would, of course, have been unaffected. Thus, the Late Woodland period could have witnessed some adjustment in mobility strategies, but was still unable to participate in the trends of the wider Midwest area.

This arguement then suggests that low resource productivity and spacing of resource patches is a situation best exploited by small population aggregations maintaining a high degree of mobility. This arguement may account for settlement patterns in the Ozarks, but it does not explain the cultural continuity manifested archeologically throughout the region. The explanation, rather, is probably best sought by examining the social consequences of the differential mobility strategies required in the Ozarks as compared with other parts of the riverine Midwest.

EXAMINING THE SOCIAL CONSEQUENCES OF MOBILITY

The arguement presented above implies that the high mobility maintained by Ozarks populations is somehow a factor

producing the high degree of conservatism and continuity manifested archeologically and that, conversely, the development of social complexity only follows a reduction in mobility. If we view developments such as Havana-Hopewell and Mississippian as not only being most strongly manifest among sedentary societies, but also as being developments in the social realm. If reduction in mobility is indeed one route to the evaluation of social complexity (e.g., Harris 1978), then it should be relevant to examine the relation between mobility patterns and social complexity. This has been briefly examined by a brief cross-cultural examination of the social correlates of settlement patterns.

This examination uses two sets of cross-cultural data, the first drawn from the Ethnographic Atlas (Murdock 1967), the second from the Standard Cross-Cultural Sample (Murdock and White 1969). This was necessary because of different variables coded for each set of data.

The sample from the Ethnographic Atlas included 186 societies which placed little to no reliance on agricultural products. The variables extracted were those which measured traits that seem to characterize some of the kinds of variability observed among Woodland societies and included settlement pattern, number of levels of jurisdictional hierarchy, and the basis of class stratification.

Both of these latter variables show an expectable relation with settlement pattern (Table 2.8). Fully nomadic and semi-nomadic societies exhibit more than three levels of hierachy in only one of 135 cases and 81 of these cases (60%) exhibit only two levels. Semi-sedentary and sedentary societies exhibit three levels in 40 of 51 cases exhibit although only two of these 51 cases exhibit more than three levels (Table 2.8a). Fully nomadic and semi-nomadic societies show no form of class stratification in 95 of 132 cases (72%) and, when stratification is present, it is usually on the basis of wealth alone. Semi-sedentary and sedentary societies, on the contrary, do exhibit stratification in 44 of 50 cases (88%) and is based on an elite in 17 of these cases (34%; Table 2.8b).

The analysis conducted with the Standard Cross-Cultural Sample employed 105 cases, again excluding complex agricultural societies. The variables coded included settlement pattern, community integration, community leadership, and local political succession (Murdock and Wilson 1972). Nomadic, semi-nomadic, and even semi-sedentary societies are integrated primarily by kinship or residence ties, while political or religious ties only assume importance among sedentary societies (Table 2.9a). Nomadic and semi-nomadic societies usually either lack community leadership or leadership is vested in a headman, perhaps with assistants. Such leadership forms as plural headmen, a headman with a hierarchy of assistants, or collections are confined

TABLE 2.8

STRATIFICATION VARIABLES COMPARED WITH SETTLEMENT PATTERN

a. Settlement Pattern with Levels of Jurisdictional Hierarchy

Levels	Fully Nomadic	Settlement Semi-Nomadic	Pattern Semi-Sedentary	Fully Sedentary
2	32	49	7	2
3	13	40	23	17
4	0	1	1	1

b. Settlement Pattern with Basis of Class Stratification

	SETTLEMENT PATTERN			
Basis	Fully Nomadic	Semi-Nomadic	Semi-Sedentary	Fully Sedentary
None	34	61	5	1
Wealth	9	24	17	10
Elite	1	3	9	8

TABLE 2.9

COMMUNITY ORGANIZATION VARIABLES COMPARED WITH SETTLEMENT PATTERNS

a. Settlement with Community Integration

SETTLEMENT PATTERN

	Nomatic	Semi-Nomatic	Rotating	Semi-Sedentary	Impermanent Settlement	Permanent Settlement
Lacking	0	0	0	0	0	2
Common Ident.	1	1	1	3	1	4
Kinties	5	7	1	5	7	23
Soc. Eco. Status	0	1	0	0	0	2
Political ties	0	0	0	0	2	10
Religious ties	2	1	0	3	2	7
Residence	5	5	0	0	1	3

b. Settlement with Community Leadership

SETTLEMENT PATTERN

	Nomatic	Semi-Nomatic	Rotating	Semi-Sedentary	Impermanent Settlement	Permanent Settlement
Lacking	4	2	0	0	2	2
Headman	8	8	0	3	3	14
Plural headman	0	0	0	2	1	2
Hmmry asst.	1	5	1	4	6	20
Hmmry hier.	0	0	0	1	0	6
Collective	0	0	1	1	1	4
Too complex	0	0	0	0	0	3

TABLE 2.9

COMMUNITY ORGANIZATION VARIABLES COMPARED WITH SETTLEMENT PATTERN (Continued)

c. Settlement with Local Political Succession

SETTLEMENT PATTERN

	Nomatic	Semi-Nomatic	Rotating	Semi-Sedentary	Impermanent Settlement	Permanent Settlement
Lacking	4	2	0	0	2	2
Appointment	0	0	0	0	0	5
Seniority	2	0	1	1	0	3
Divination	0	1	0	0	0	1
Consensus	4	9	1	1	5	7
Election	0	0	0	0	1	4
Patri. Hered.	3	3	0	4	3	17
Mafri. Hered.	0	0	0	4	2	6
Linge	0	0	0	1	0	5

to semi-sedentary and sedentary societies (Table 2.9b). The succession of headman is usually determined by consensus, seniority, or patrilineal heredity in nomadic and semi-nomadic societies and it is only in the semi-sedentary or sedentary societies that election or other forms of heredity become important (Table 2.9c).

This rather simple analysis is nevertheless sufficient to suggest that features of complex societies rarely occur among mobile peoples. The reasons most likely have something to do with increased information flow (cf. Flannery 1972) and organizational responses (cf. Johnson 1978, 1982). Overall, the analysis suggests that high mobility and its consequences for social complexity may be a key element in understanding prehistoric continuity in the Missouri Ozarks.

LITERATURE CITED

Adams, Lee M.
1950 The Table Rock basin in Barry County, Missouri. Missouri Archaeological Society Memoir 1.

Ahler, Stanley A.
1976 Sedimentary processes at Rodgers Shelter. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 123-139. Academic Press, New York.

Anderson, David G. and Joseph Schuldenrein
1983 Early Archaic settlement on the southeastern Atlantic slope: a view from the Rucker's Bottom site, Elbert County, Georgia. North American Archaeologist 4(3):177-210.

Anderson, Duane C., Richard Shutler, Jr. and Wayne M. Wendland
1980 The Cherokee Sewer Site and the cultures of the Atlantic climatic episode. In The Cherokee excavations: Holocene ecology and human adaptations in northwestern Iowa, edited by Duane C. Anderson and Holmes A. Semken, Jr., pp. 257-268. Academic Press, New York.

Benedict, James B.
1978 The Mount Albion Complex and the Altithermal. In The Mount Albion Complex, by James B. Benedict and Byron L. Olson, pp. 139-180. Center for Mountain Archeology Research Report 1. Ward, Colorado.

Brakenridge, G. Robert
n.d. The impact of climatic change on floodplain sediment, soil formation, and eolian activity in southern Missouri. Manuscript.

Bray, Robert T.
1956 The culture complexes and sequence at the Rice site (23SN200), Stone County, Missouri. The Missouri Archaeologist 18(1-2):46-134.

Brown, James A., et al.
n.d. Preliminary contributions of Koster site research to paleo-environmental studies of the central Mississippi valley. Unpublished manuscript.

Brown, James A. and Robert K. Vierra
1983 What happened in the Middle Archaic? introduction to an ecological approach to Koster site archaeology. In Archaic hunter-gatherers in the American Midwest, edited by James L. Phillips and James A. Brown, pp. 165-195. Academic Press, New York.

Broyles, Bettye J.
1966 Preliminary report: the St. Albans site (46KA27), Kanawha County, West Virginia. The West Virginia Archaeologist 19:1-43.

Butzer, Karl W.
1982 Archaeology as human ecology. Cambridge University Press, Cambridge.

Cable, John S.
1982 Organizational variability in Piedmont hunter-gatherer lithic assemblages. In The Haw River sites: archeological investigations at two stratified sites in the North Carolina Piedmont, assembled by Stephen R. Claggett and John S. Cable, pp. 637-688. Report to the U.S. Army Corps of Engineers, Wilmington District. Report R-2386. Commonwealth Associates Inc. Jackson, Michigan.

Calabrese, F.A., Rolland E. Pangborn, and Robert J. Young
1969 Two village sites in southwestern Missouri: a lithic analysis. Missouri Archaeological Society Research Series 7.

Caldwell, Joseph R.
1958 Trend and tradition in the prehistory of the eastern United States. American Anthropological Association Memoir 88.

Carlisle, R.C. and J.M. Adovasio (editors)
1982 Meadowcroft. Department of Anthropology, University of Pittsburgh, Pittsburgh, Pennsylvania.

Carlson, David L.
1979 Hunter-gatherer mobility strategies: an example from the Koster site in the lower Illinois valley. Unpublished Ph.D. dissertation, Northwestern University.

Chapman, Carl H.
1954 Preliminary salvage archaeology in the Pomme de Terre Reservoir, Missouri. The Missouri Archaeologist 16(3-4):1-116.

1975 The archaeology of Missouri, I. The University of Missouri Press, Columbia.

1980 The archaeology of Missouri II. The University of Missouri Press, Columbia.

Chapman, Jefferson
1975 The Rose Island site. University of Tennessee Department of Anthropology Report of Investigations 14.

1976 The Archaic period in the lower Little Tennessee River valley: the radiocarbon dates. Tennessee Anthropologist 1(1):1-12.

1977 Archaic period research in the lower Little Tennessee River valley. University of Tennessee Department of Anthropology Report of Investigations 18.

Cleland, Charles E.
1976 The Focal-Diffuse Model: an evolutionary perspective on the prehistoric cultural adaptations of the Eastern United States. Midcontinental Journal of Archaeology 1:59-76.

Coe, Joffre L.
1964 The Formative Cultures of the Carolina Piedmont. Transactions of the American Philosophical Society 54(5).

Collins, Charles D., Andris A. Danielsons, and James A. Donohue
1983 The Downstream Stockton study: investigations at the Montgomery site, 23CE261. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri, Columbia.

Cook, Thomas G.
1976 Koster: an artifact analysis of two Archaic phases in west-central Illinois. Northwestern University Archeological Program Prehistoric Records 1.

Davis, Hester A.
1967 Paleo-Indian in Arkansas. The Arkansas Archeologist 8(1):1-3.

Denny, Sidney G.
1964 A Re-evaluation of the Boone Focus: a Late Woodland manifestation in central Missouri. Unpublished M.A. thesis, University of Missouri, Columbia.

Flannery, Kent V.
1972 The cultural evolution of civilizations. Annual Review of Ecology and Systematics 2:399-426.

Fortier, Andrew C.
1983 Settlement and subsistence at the Go-Kart North site: a Late Archaic Titterington occupation in the American Bottom, Illinois. In Archaic hunter-gatherers in the American Midwest, edited by James L. Phillips and James A. Brown, pp. 243-260. Academic Press, New York.

Fowler, Melvin L.
1959 Summary report of Modoc Rock Shelter, 1952, 1953, 1955, 1956. Illinois State Museum Report of Investigations 8.

Gardner, William M.
1974 The Flint Run Paleo-Indian complex: a preliminary report 1971-1973 seasons. The Catholic University of America Archeology Laboratory Occasional Publication 1.

Goodyear, Albert C.
1974 The Brand site: a techno-functional study of a Dalton site in northeast Arkansas. Arkansas Archaeological Survey Research Series 7.

1982 The chronological position of the Dalton horizon in the southeastern United States. American Antiquity 47(2):382-395.

Goodyear, Albert C., John H. House, and Neal W. Ackerly
1979 Laurens - Anderson: an archeological study of the inter-riverine Piedmont. Occasional Papers of the Institute of Archeology and Anthropology, The University of South Carolina, Anthropological Papers 4.

Gruger, J.
1973 Studies on the late Quaternary vegetation history of northeastern Kansas. Geological Society of America Bulletin 84:239-250.

Harris, David R.
1978 Settling down: an evolutionary model for the transformation of mobile bands into sedentary communities. In The evolution of social systems, edited by J. Friedman and M.J. Rowlands, pp. 401-417. Duckworth, London.

Haynes, C. Vance
1976 Late Quaternary geology of the Pomme de Terre River valley. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 47-61. Academic Press, New York.

1983 Report on geochronological investigations in the Harry S. Truman Reservoir area, Benton and Hickory Counties, Missouri. In Cultural resources survey, Harry S. Truman dam and reservoir project, Vol. X, Environmental study papers, pp. 25-34. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri, Columbia.

House, John H. and David L. Ballenger
1976 An archeological survey of the Interstate 77 route in the South Carolina Piedmont. University of South Carolina Institute of Archeology and Anthropology Research Manuscript Series 104.

House, John H. and Ronald W. Wogaman
1978 Windy Ridge: a prehistoric site in the inter-riverine Piedmont in South Carolina. Occasional Papers of the Institute of Archeology and Anthropology, The University of South Carolina, Anthropological Studies 3.

Jefferies, Richard W.
1982 Archaeological overview of the Carrier Mills District. In The Carrier Mills Archaeological Project: human adaptation in the Saline valley, Illinois, edited by Richard W. Jefferies and Brian M. Butler, pp. 1459-1509. Southern Illinois University at Carbondale Center for Archaeological Investigations Research Paper 33.

Johnson, Donald L.
1983 Soils and soil-geomorphic investigations in the lower Pomme de Terre valley. In Cultural resources survey, Harry S. Truman dam and reservoir project, Vol. X, Environmental study papers, pp. 63-143. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri, Columbia.

Johnson, Eileen and Vance T. Holliday
1980 A Plainview kill/butchering locale on the Llano Estacado-the Lubbock Lake site. Plains Anthropologist 25(88):89-111.

Johnson, Gregory A.
1978 Information sources and the development of decision-making organizations. In Social archeology: beyond subsistence and dating, edited by Charles L. Redman et al., pp. 87-112. Academic Press, New York.

1982 Organization structure and scalar stress. In Theory and explanation in archaeology: the Southampton Conference, edited by Colin Renfrew, Michael J. Rowlands, and Barbara Abbott Segraves, pp. 389-421. Academic Press, New York.

Kay, Marvin (ed.)
1982 Holocene adaptations within the lower Pomme de Terre valley, Missouri. Report to the U.S. Army Corps of Engineers, Kansas City District. Illinois State Museum Society, Springfield.

King, James E.
1973 Late Pleistocene palynology and biogeography of the western Missouri Ozarks. Ecological Monographs 43:539-565.

1980 Post-Pleistocene vegetational changes in the midwestern United States. In Archaic prehistory on the Prairie-Plains border, edited by Alfred E. Johnson, pp. 3-11. University of Kansas Publications in Anthropology 8.

King, James E. and William H. Allen, Jr.
1977 A Holocene vegetation record from the Mississippi River valley, southeastern Missouri. Quaternary Research 8:307-323.

King, James E. and Everett H. Lindsay
1976 Late Quaternary biotic records from spring deposits in western Missouri. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 63-78. Academic Press, New York.

Koch, Albert C.
1857 Mastodon remains, in the State of Missouri, together with evidences of the existence of man contemporary with the mastodon. Transactions of the Academy of Science of St. Louis 1:61-64.

Lewis, Thomas M.N. and Madeline Kneberg Lewis
1961 Eva: an Archaic site. The University of Tennessee Press, Knoxville.

Long, Austin and Bruce E. Rippeteau
1974 Testing contemporaneity and averaging radiocarbon dates. American Antiquity 39:205-215.

Marshall, Richard A.
1958 The use of Table Rock reservoir in the delineation of cultural complexes and their distribution. Unpublished M.A. thesis, University of Missouri, Columbia.

Martin, Terrell L.
1976 Prehistoric settlement-subsistence relationships in the Fishing River drainage, western Missouri. The Missouri Archaeologist 37:1-91.

McMillan, R. Bruce
1965 Gasconade prehistory: a survey and evaluation of the archaeological resources. The Missouri Archaeologist 27(3-4):1-114.

1971 Biophysical change and cultural adaptation at Rodgers Shelter, Missouri. Ph.D. dissertation, University of Colorado, Boulder.

1976 The dynamics of cultural and environmental change at Rodgers Shelter, Missouri. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 211-232. Academic Press, New York.

McMillan, R. Bruce and Walter L. Klippel
1981 Post-glacial environmental change and hunting-gathering societies of the southern Prairie Peninsula. Journal of Archaeological Science 8:215-245.

Morse, Dan F.
1973 Dalton culture in northeast Arkansas. The Florida Anthropologist 26(1):23-38.

1975 Reply to Schiffer. In the Cache River archeological project: an experiment in contract archeology, assembled by Michael B. Schiffer and John H. House, pp. 113-120, Arkansas Archeological Survey Research Series 8.

1977 Dalton settlement systems: reply to Schiffer (2). Plains Anthropologist 22(76):149-158.

Murdock, George P.
1967 Ethnographic atlas. University of Pittsburgh Press, Pittsburgh.

Murdock, George P. and Douglas R. White
1969 Standard cross-cultural sample. Ethnology 8:329-369.

Murdock, George P. and Suzanne F. Wilson
1972 Settlement patterns and community organization: cross-cultural codes 3. Ethnology 11:254-295.

Newton, John P.
1977 Paleo-Indian in the Arkansas Ozarks: a preliminary statement. The Arkansas Archeologist 16-17-18: 85-92.

O'Brien, Patricia J.
1978 Steed-Kisker: a western Mississippian settlement system. In Mississippian settlement patterns, edited by Bruce D. Smith, pp. 1-19. Academic Press, New York.

Pangborn, Rolland E., H. Trawick Ward, and W. Raymond Wood
1971 Flycatcher village: a non-pottery site in the Stockton Reservoir, Missouri. Plains Anthropologist 16(51):60-73.

Piontkowski, Michael R.
1983 Preliminary archeological investigations at two Early Archaic sites: the Wolf Creek and Hand sites. In Cultural resources survey, Harry S. Truman dam and reservoir project, Vol IX, Preliminary studies of Early and Middle Archaic components, pp. 1-47. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology District, University of Missouri, Columbia.

Price, James E. and James J. Krakker
1975 Dalton occupation of the Ozark border. University of Missouri Museum of Anthropology Museum Briefs 20.

Purrington, Burton L.
1971 The prehistory of Delaware County, Oklahoma: cultural continuity and change on the western Ozark periphery. Unpublished Ph.D. dissertation, University of Wisconsin-Madison.

1980 An archaeological reconnaissance of proposed levees, water-oriented recreation facilities, and borrow areas downstream from the Harry S. Truman Dam and Reservoir, Benton County, Missouri: 1980. Report to the U.S. Army Corps of Engineers, Kansas City District. Center for Archaeological Research, Southwest Missouri State University, Springfield.

Reagan, Michael J.
1981 Paleo-Indian remains from northwest Missouri. The Missouri Archaeologist 42:17-26.

Reagan, Michael J., et al.
1978 Flake Tools Stratified below Paleo-Indian Artifacts. Science 200:1272-1275.

Reid, Kenneth C.
1980 Nebo Hill: Archaic political economy in the riverine Midwest. Unpublished Ph.D. dissertation, University of Kansas. University Microfilms, Ann Arbor.

1983 The Nebo Hill Phase: Late Archaic prehistory in the Lower Missouri valley. In Archaic Hunters and Gatherers in the American Midwest, edited by James L. Phillips and James A. Brown, pp. 11-39. Academic Press, New York.

Roberts, Ralph G.
1965 Tick Creek Cave: an Archaic site in the Gasconade River valley of Missouri. The Missouri Archaeologist 27(2):1-52.

Roper, Donna C.
1981 A Paleo-Indian point from Henry County, Missouri. Plains Anthropologist 26(94):311-317.

Roper, Donna C. and Michael R. Piontkowski
1983 Projectile points. In Cultural resources survey, Harry S. Truman Dam and Reservoir project, Vol. V, Lithic and ceramic studies, pp. 121-268. Report to the U.S. Army Corps of Engineers, Kansas City District. American Archaeology Division, University of Missouri, Columbia.

Roper, Donna C. and W. Raymond Wood
1975 Research design for the cultural resources survey, Harry S. Truman Dam and Reservoir project: the archaeological survey. American Archaeology Division, University of Missouri, Columbia.

Rowlett, Ralph M.
1981 A lithic assemblage stratified beneath a fluted point horizon in northwest Missouri. The Missouri Archaeologist 42:7-16.

Saunders, Jeffrey J.
1977 Late Pleistocene vertebrates of the western Ozark Highland, Missouri. Illinois State Museum Reports of Investigations 33.

1983 Mitigation of the adverse effects upon the local paleontological resources of the Harry S. Truman Dam and Reservoir, Osage River Basin, Missouri. Report to the U.S. Army Corps of Engineers, Kansas City District. Illinois State Museum Society, Springfield.

Schiffer, Michael B.

1975a An alternative to Morse's Dalton settlement pattern hypothesis. Plains Anthropologist 20(70):253-266.

1975b Some further comments on the Dalton settlement pattern hypothesis. In The Cache River archeological project, assembled by Michael B. Schiffer and John H. House, pp. 103-112. Arkansas Archeological Survey Research Series 8.

Schmits, Larry J.

1978 The Coffey Site: environment and cultural adaptation at a prairie plains Archaic site. Midcontinental Journal of Archaeology Special Paper 1.

Scholtz, James A.

1969 A summary of prehistory in northwest Arkansas. Bulletin of the Arkansas Archeological Society 10(1-3):51-60.

Shay, C. Thomas

1971 The Itasca bison kill site: an ecological analysis. Minnesota Prehistoric Archaeology Series. Minnesota Historical Society, St. Paul.

Stanford, Dennis

1979 The Selby and Dutton Sites: Evidence for a Possible Pre-Clovis Occupation of the High Plains. In Pre-Llano Cultures of the Americas: Paradoxes and Possibilities, edited by R.L. Humphrey and D. Stanford, pp. 101-123. Anthropological Society of Washington, Washington, D.C.

Stanford, Dennis, Waldo R. Wedel, and G.R. Scott

1981 Archeological Investigations at the Lamb Spring Site. Southwestern Lore 47:14-27.

Sytles, Bonnie W., Steven R. Ahler, and Melvin L. Fowler

1983 Modoc Rock Shelter revisited. In Archaic hunters-gatherers in the American Midwest, edited by James L. Phillips and James A. Brown, pp. 261-297. Academic Press, New York.

Taylor, Richard L. et al.
1982 Archeological survey and reconnaissance within the ten-year floodpool, Harry S. Truman Dam and Reservoir. Report to the U.S. Army Corps of Engineers, Kansas City District. Report R-2324. Commonwealth Associates Inc., Jackson, Michigan.

Teter, David C. and Robert E. Warren
1979 A dated projectile point sequence from the Pigeon Roost Creek sites. In Cannon Reservoir Human Ecology Project, edited by Michael J. O'Brien and Robert E. Warren, pp. 227-251. Interim report to the U.S. Army Corps of Engineers, St. Louis District. University of Nebraska, Lincoln.

Tuck, James A.
1974 Early Archaic horizons in eastern North America. Archaeology of Eastern North America 2(1):72-80.

Watts, William A.
1980 Late Quaternary vegetation history at White Pond on the inner coastal plain of South Carolina. Quaternary Research 13:187-199.

Whitehead, Donald R.
1965 Palynology and Pleistocene phytogeography of unglaciated eastern North America. In The Quaternary of the United States, edited by H.E. Wright, Jr. and David G. Frey, pp. 417-432. Princeton University Press, Princeton.

1973 Late-Wisconsin vegetational changes in unglaciated eastern North America. Quaternary Research 3:621-631.

Wiant, Michael D., Edwin R. Hajic, and Thomas R. Styles
1983 Napoleon Hollow and Koster site stratigraphy: implications for Holocene landscape evolution and studies of Archaic period settlement patterns in the lower Illinois River valley. In Archaic hunters-gatherers in the American Midwest, edited by James L. Phillips and James A. Brown, pp. 147-164. Academic Press, New York.

Wiens, John A.
1976 Population responses to patchy environments. Annual review of ecology and systematics 7:81-120.

Williams, Stephen and James B. Stoltman
1965 An outline of southeastern United States prehistory with particular emphasis on the Paleo-Indian era. In The Quaternary of the United States, edited by H.E. Wright, Jr. and David G. Frey, pp. 669-683. Princeton University Press, Princeton.

Winters, Howard D.
1969 The Riverton Culture. Illinois State Museum Reports of Investigations 13.

Wood, W. Raymond
1957 Five projectile points from western Missouri. Missouri Archaeological Society Newsletter 116:10-11.

1961 The Pomme de Terre Reservoir in western Missouri prehistory. The Missouri Archaeologist 23:1-131.

1968 Mississippian hunting and butchering patterns from the Vista Shelter, 23SR20, Missouri. American Antiquity 33:170-179.

1976 Archaeological Investigations at the Pomme de Terre springs. In Prehistoric man and his environments: a case study in the Ozark Highland, edited by W. Raymond Wood and R. Bruce McMillan, pp. 97-107. Academic Press, New York.

Wood, W. Raymond and Donald L. Johnson
1978 A survey of disturbance processes in archaeological site formation. In Advances in archaeological method and theory, Vol.1 edited by Michael B. Schiffer, pp. 315-381. Academic Press, New York.

Wood, W. Raymond and R. Bruce McMillan
1967 Recent investigations at Rodgers Shelter, Missouri. Archaeology 20(1):52-55.

Wood, W. Raymond and R. Bruce McMillan (editors)
1976 Prehistoric man and his environments: a case study in the Ozark Highland. Academic Press, New York.

APPENDICES

APPENDIX A

SELGEM FORMS

The following are copies of the various forms used during the project for computer data processing using the SELGEM series of programs. Their use and interpretation is explained in Part 1, Chapter 5 of this volume.

STATE Missouri (00101) ______ SITE NUMBER 23 ______ (01001) GEN. TYPE Lithic (06001) HORIZ (02101) ______ PAGE ___ of ___

TP (02102) ______

COUNTY ______ (00501) S, E, OR St ______ (02001) RAW MATERIAL ______ VERT (02201) ______

RECORDED BY ____/____ DATE ______/______

SELG #	ART. #	COLOR 15001	CHERT 16001	SOURCE 16501	BREAK 07001	M1 21001	M2 21501	M3 22001	M4 22501	A1 23001	A2 23501	A3 24001	TECHNOLOGICAL CLASS 09001	SHAPE CLASS 08001	COMMENTS 30001

VERIFIED BY ______ DATE ______ 1979
CORRECTIONS BY ______ DATE ______ 1979

DATE ENTERED ______ BY ______
DSN ______ IN MF ______
CORRECTIONS ENTERED ______

DATE ENTERED ______ BY ______
DSN ______ IN MF ______
CORRECTIONS ENTERED ______

STATE MO
(00101)
COUNTY
(00501)
SITE NO. 23
(01001)

HARRY S. TRUMAN RESERVOIR

ARTIFACT CATALOG

Page No.

Recorded by

Date

DSN

IN MF

SERIAL #

TO

Computer use only

CAT. NO. (05001)	PROVENIENCE				CATEGORY:		RAW MATERIAL, COLOR (15001)*	NO. OF PIECES (20001)	COMMENTS (20002)
	ExorSur (02001)	Horizontal-in Meters (02101)	TP/SQ/Feat. &No. (02102)	Vertical-in cm.* (02201)	Gen.Type* (06001)	Specific Item* (06001)			

Page No. ________

HARRY S. TRUMAN RESERVOIR
DATA ENTRY LOG

Class ID No.	Serial Range		Entry Code	Date	In	Tape		S or E	Content
	From	To			MF	On No.	File No.		

HARRY S TRUMAN RESERVOIR

ON TAPE RECORD

TAPE NUMBER			TAPE NUMBER		
Label/File	DSN	Descr.	Label/File	DSN	Descr.

HST Reservoir Project
SELGEM REQUEST FORM

Date_______________
Date Needed________
Requested By_______
From_________Catalogue

Processed By_________
Date_______________
MF dsn_______________
Tape________Label____
computer use only

***QUERY REPORT (Selext)

____Retrieve all records in which: any word/the ___ word of category no. __ __ __
is: equal to " __ __ __ __ __ __ __ __ __ __ __ __ __ "
greater than (13 characters)
less than
not equal to
not greater than
not less than

(repeat as needed):
and the _____word, category __ __ __ is __________ "______________________________"
or
and the _____word, category __ __ __ is __________ "______________________________"
or
and the _____word, category __ __ __ is __________ "______________________________"

___OUTPUT to printer with the message "_______________"
___Save all results for further processing by OUTPUTing to magnetic tape.
___INCLUDE only categories ___,___,___,___,___,___,___,___ in the output (optional).
(ascending order)
___TALLY the number of records retrieved.

***SORTING (Selkey)

____Sort all records from query alphabetically to the following keys (major to minor):
Category __ __ __ all words as one key, or
character position no.____ for ____ columns
Category __ __ __ character no.____ for ____ columns
Category __ __ __ character no.____ for ____ columns
Category __ __ __ character no.____ for ____ columns

***LISTING (Sellst)

____List above query/sort combination.
____List query only.
____List sort only.

***REPORT WRITING (Selrpv)

____Print ___copies of above query/sort using 3800 white paper.
Attach printer spacing chart or facsimilie showing the exact
vertical and horizontal spacing of:
1. Headings-top line, date, page no., column titles.
2. Detail entries-specify which category and character positions to use
where.

___Use the following translations for coded items:____________________________

Processed by________
Date____________
MF dsn____________
Tape__________Label__
computer use only

HST Reservoir Project
SELGEM REQUEST FORM #2

Date______________
Date Needed_________
Requested by_________
From________Catalogue

***LISTING (Sellst)

____List Masterfile for all categories with a page heading of
"____"
(55 characters or less)

___Include only the following categories:____ ____ ____ ___ ____ ____
___List only Selgem serial nos. __________ thru _________.
___Please include category definitions in the printout.

***DATA FREQUENCY-TABULATION REPORT (Selept)

____List alphabetically all words used in category/ies:
____ ____ ____ ____ ____ ____ ___ ____ ____ ____ ____ ____ ____ _____
along with the serial numbers in which that data occurs, and a tally of
of the frequency of occurrence.

HARRY S. TRUMAN RESERVOIR
Selgem Correction Form
Site No. 23_______
Page __ of ___

Code:
2=delete entry
3=change
4=addition

Class	Selgem No.		Cat./Ln.	15 DATA 64	Intls	Date	COMPUTER USE Entered by	Date
300		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
		3		& &				
300		4						
		4						
		4						
		4						
		4						
		4						
		4						
		4						
		4						
		4						
		4						
		4						
		4						
300		2						
		2						
		2						
		2						
		2						
		2						

HARRY S. TRUMAN RESERVOIR
COMPUTER ACCOUNTING FORM

Page No. ____

Date	User	Description of Computer Activity	Est. Job Cost	Est. Daily Tot.Cost	Est. Daily Balance		Verified Balance

W.K.

HST RESERVOIR SITE ENTRY FORM
8-79

SELGEM NO.	SITE NO.	FIELD NO.	LEGAL LOCATION	TRACT NO.	QUAD	COE	POS. IN RESV.	ELEV.	TYPE	STRAT. TRANS.
	(001)	(005)	(010)	(015)	(020)	(025)	(030)	(035)	(040)	(045)

APPENDIX B

RESULTS OF RADIOMETRIC DATING

by

Susan K. Goldberg
and
Donna C. Roper

APPENDIX B

RESULTS OF RADIOMETRIC DATING DETERMINATIONS FROM SITES IN THE HARRY S. TRUMAN RESERVOIR

by

Susan K. Goldberg
and Donna C. Roper

INTRODUCTION

In order to refine the chronology of the prehistoric settlement in the southwest Missouri Ozarks, a number of absolute dates from several occupations were required. The following reports represent the results of three separate series of samples submitted to different laboratories and processed with different techniques - thermoluminescence, archaeomagnetism, and Carbon-14. All of these dating determinations were carried out under Modification No. P00002 of Contract No. DACW41-77-C-0132.

THERMOLUMINESCENCE DATING

The first and largest set of dates was determined by the thermoluminescence technique. Poor preservation precluded the gathering of more than a handful of charcoal samples amenable to Carbon-14 dating. Thermoluminescence dating, while being a fairly new technique, allowed much more latitude in the choice of samples; it could date the lithics which were so abundant in the reservoir area. It had the added attraction of being less costly and had the potential for dating actual tool specimens rather than associations. This allowed direct refinement of the chronologies which had previously been based on tool forms.

The following information represents the results of work carried out on Truman Reservoir samples in the Thermoluminescence laboratories at the University of Missouri-Columbia under the direction of Dr. Ralph M. Rowlett. Samples of chert, limestone, and ceramics from six open sites and several burial tumuli were submitted for age determinations. Provenience data, results of the analyses, and comments by both the dating laboratory personnel and the excavators are provided. Technical information pertaining to the processing is presented in Table 1.

TABLE 1

Technical Results of Thermoluminescence Analyses

Site and Sample Nos.	Environmental Radiation (RADS per annum)	Irradiation Dose (R)	Induced Age (Years)	Original TL/ Induced TL	% Error ±	Calculated Age B.P.	Date
BE337-1	0.445	550±2%	1,236	0.868	9.0	1073	A.D. 904±97
BE337-2	0.445	550±2%	1,236	0.909	8.1	1123	A.D. 854±91
BE337-3	0.396	550±2%	1,389	0.977	8.1	1357	A.D. 620±110
BE337-4	0.396	550±2%	1,389	0.967	8.1	1343	A.D. 634±109
BE337-5	0.602	2500±35	4,153	0.807	8.4	3351	1374 B.C.±282
BE337-6	0.602	2600±2%	4,153	1.249	8.1	5394	3417 B.C.±437
BE337-7	0.396	2500±35	6,313	0.878	7.4	5542	3566 B.C.±410
BE337-9	0.602	2998±42	4,980	1.061	8.7	5284	3305 B.C.±460
BE676-2	0.317	2500±35	7,886	0.993	8.9	7831	5854 B.C.±697
BE676-3	0.414	2504±35.1	6,048	1.035	9.1	6260	4283 B.C.±570
BE676-4	0.402	1499±21	3,729	1.254	9.0	4676	2699 B.C.±421
BE676-5	0.532	1499±21	2,818	1.244	9.0	3505	1528 B.C.±315
BE676-6	0.402	1000±14	2,488	0.818	8.9	2035	58 B.C.±181
HI297-1	0.607	850±2%	1,400	1.068	9.6	1496	A.D. 483±144
HI297-3	0.635	850±2%	1,339	1.182	9.6	1582	A.D. 397±152
HI297-4	0.667	850±2%	1,274	0.838	9.6	1068	A.D. 911±103
HI297-5	0.505	999±14	1,978	1.000	8.5	1978	A.D. 1±168
HI297-6	0.452	1500±21	3,319	1.078	8.4	3577	1598 B.C.±301
HI297-8	0.683	1250±2%	1,814	0.961	9.6	1743	A.D. 236±167
HI297-9	0.689	8999±126	13,061	1.284	8.5	16,770	14,791 B.C.±1425
HI297-10	0.378	200±2%	529	1.251	9.6	662	A.D. 1317±64
HI297-11	0.689	2600±2%	3,774	0.776	9.1	2928	949 B.C.±266
HI297-12	0.655	1405±1.5%	2,145	est. 1.000	8.7	2145	A.D. 125±500
HI297-13	0.667	1298±18	1,946	0.914	8.7	1779	A.D. 200±155
HI297-14	0.689	1298±18	1,884	1.276	8.7	2404	425 B.C.±209
HI297-15	0.689	1298±18	1884	1.041	8.7	1961	A.D. 18±171
HI297-16a	0.667	1298±18	1,946	1.300	11.7	2612	633 B.C.±306
HI297-16b	0.667	966±14	1,450	1.130	7.4	1637	A.D. 342±121
HI297-17	0.689	966±14	1,400	0.984	7.4	1380	A.D. 599±102
HI297-18	0.423	2500±35	5,910	1.007	7.4	5950	3970 B.C.±440

TABLE 1: Continued

Technical Results of Thermoluminescence Analyses

Site and Sample Nos.	Environmental Radiation (RADS per annum)	Irradiation Dose (R)	Induced Age (years)	Original TL/ Induced TL	% Error ±	Calculated Age B.P.	Date
HI297-19	0.667	695±10	1,042	0.996	3.7	1038	A.D. 941±90
HI297-20	0.521	695±10	1,334	1.020	8.7	1361	A.D. 618±118
BE214-2	0.460	1499±21	3,259	0.856	8.5	2789	811 B.C.±237
SR189-2	0.531	1300±1.7%	2,447	0.800	9.2	1957	A.D. 22±180
SR189-3	0.584	1800±2%	3,082	0.998	9.3	3076	1098 B.C.±286
SR189-4	0.584	1800±2%	3,082	1.297	9.3	3998	2020 B.C.±372
BE681-1	0.411	7502±105	18,250	0.992	10.5	18,107	16,129 B.C.±1900
BE681-2	0.411	1500±21	3650	1.222	8.9	4460	2482 B.C.±397
BE681-3	0.411	850±2%	2068	1.105	9.3	2285	307 B.C.±213
BE681-4	0.411	850±2%	2068	1.466	9.4	3032	1054 B.C.±285
SR675-1	0.378	1800	4,762	0.882	9.3	4200	2222 B.C.±391
SR675-2	0.378	7,499.5	19,840	1.108	10.5	21,983	20,005 B.C.±2,308
HI135-1a	0.366	1043.4±14	2,851	1.053	6.7	3002	1045 B.C.±201
b	0.366	1050±2%	2,869	1.664	6.7	4774	2817 B.C.±320
$\overline{X}$	0.366	1046.7	2,860	1.359	6.7	3887	1930 B.C.±260
BE3-38$\overline{X}$	0.284	250±1.1	880.3	1.133	8.0	998	A.D. 965±80
CE122-1	0.411	261.25	636	0.971	7.9	617	A.D. 1346±49
CE122-51	0.311	200±2%	643	0.851	5.0	547	A.D. 1416±27
BE6-M2-102I	0.313	233.9±3.3	747	0.962	5.0	719	A.D. 1239±36
BE6-M2-103D	0.313	233.9±3.3	747	1.209	5.0	902	A.D. 1056±45
BE6-M1-107B	0.233	233.9±3.3	1,004	0.895	5.0	898	A.D. 1060±45
CE123-100	0.352	233.9±3.3	665	1.221	6.8	811	A.D. 1151±55
BE136-15	0.262	200±2%	763	1.137	5.0	864	A.D. 1100±43
BE128-14	0.179	109.97±1.5	614	0.880	5.0	541	A.D. 1422±27

23BE337 – The Terre Baby Site

23BE337-1.
Date: A.D. 904 ± 97
Provenience: 60S 78E, 0 to 10 cm below plow zone
Material: Chert
Comments: This component includes material stylistically from the Late Woodland and Late Archaic (Afton points) periods. Appears to accurately date the Woodland material and support the notion that Late Archaic forms persisted into later periods.

23BE337-2
Date: A.D. 854 ± 91
Provenience: 62S 83E, 0 to 10 cm below plow zone
Material: Chert
Comments: Supports previous date

23BE337-3
Date: A.D. 620 ± 110
Provenience: 61S 83E, 20 to 30 cm below plow zone
Material: Chert
Comments: Dates the lower portion of the component which includes Late Woodland and Late Archaic projectile point forms. See comment from Sample #1.

23BE337-4
Date: A.D. 634 ± 109
Provenience: 67S 84E, 20 to 30 cm below plow zone
Material: Limestone
Comments: Supports previous date

23BE337-5
Date: 1374 ± 282 B.C.
Provenience: 62S 84E, 40 to 50 cm below plow zone
Material: Chert
Comments: Stratigraphically a good date, placing the assemblage at this depth in the Late Archaic period. No diagnostic point forms to evaluate this result.

23BE337-6
Date: 3417 ± 437 B.C.
Provenience: 61S 83E, 50 to 60 cm below plow zone
Material: Limestone
Comments: Stratigraphically a good date. A Middle Archaic square stem point immediately below this stratum would support the date.

23BE337-7
Date: 3600 ± 500 B.C.
Provenience: 60S 79E, 30 to 40 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: Two pieces of

chert were processed – one grey and one pink. The age determination cited here was based on the grey one and not the pink, although in general from the Truman Reservoir the better, or more consistent dates, were from the pink chert. The pink chert here would have given an apparent age of ca. 7,500 years B.P., meaning it was heated, but perhaps not to 400 degrees. The age given here is consistent with earlier runs made on 23BE337 materials, especially BE337-9.
Comments: Stratigraphically the date is much too early, being above sample #5. This may have been a piece of chert redeposited from an earlier component from a lower depth.

23BE337-8
Chert sample did not appear to be heated, and so, was not processed.

23BE337-9
Date: 3305 ± 500 B.C.
Provenience: 61S 83E, 50 to 60 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: An internally consistent date.
Comments: Supports date from sample #6 which was from the same stratigraphic unit.

23BE676 – The Cootie Site

23BE676-1
Date: None
Provenience: Feature #14 in ON19W, 30 to 40 cm below surface
Material: Limestone
Comments by Thermoluminescence Laboratory: This sample could not be accurately dated by the T.L. process. After being irradiated at 850R, 1500R, and 2500R, the resulting Original TL/Induced TL responses remained virtually unchanged despite the significant increases in irradiation doses.

23BE676-2
Date: 5854 ± 697 B.C.
Provenience: Test pit #1, 20 to 30 cm below surface
Material: Smith point (Category 326)
Comments by Thermoluminescence Laboratory: In terms of consistent behavior in our laboratory, this piece was very consistent. In that sense, this should be a very reliable determination.
Comments: This specimen was out of context, mixed with Woodland materials in an area which was deflated. Dating the projectile point itself, we were hoping to date the Smith component present in the lower excavations. This date appears unreasonably early for a Late Archaic form. Moreover, all dates from this site appear to be much too early. Due to this

consistency we must look to outside factors such as unreliable background readings (taken from soil samples removed from the site two years prior to monitoring their irradiation levels) or exposure of the samples subsequent to excavation.

23BE676-3
Date: 4283 ± 570 B.C.
Provenience: 1N 22W, 20 to 30 cm below surface
Material: Chert
Comments: From a spatially distinct Standlee assemblage. Date too early.

23BE676-4
Date: 2699 ± 421 B.C.
Provenience: ON 15W, 20 to 30 cm below surface
Material: Chert
Comments: From a Standlee assemblage immediately below a Late Woodland assemblage. Date probably too early.

23BE676-5
Date: 1528 ± 315 B.C.
Provenience: 1N 12W, 10 to 20 cm below surface
Material: Chert
Comments: From a Late Woodland component containing Rice Side-Notched and Fresno points. Date too early.

23BE676-6
Date: 58 ± 181 B.C.
Provenience: ON 17W, 10 to 20 cm below surface
Material: Chert
Comments: From the Late Woodland component dated by Sample #5. Date too early.

23HI297 — The Cross Timbers Site

LOCUS I

23HI297-1
Date: A.D. 483 ± 144
Provenience: Locus I, 73N 82W, 10 to 20 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: This should be a very dependable date.
Comments: This sample is from a shovel excavated test unit in an area which was later mechanically stripped. This portion of 23HI297, on the lower terrace (T-0) appears to be a single component occupation. Materials include several Woodland projectile forms, as well as a few (i.e. Afton) which are typically Late Archaic forms.

23HI297-2
Date: None
Provenience: Feature #2, Locus I, Stripped Area
Material: Chert
Comments by Thermoluminescence Laboratory: Sample not heated sufficiently to 400^{o} C. in antiquity. Sample was cut, original T.L. recorded, annealed, then irradiated at 850R. The induced T.L. reading produced a very high, very unlikely date.

23HI297-3
Date: A.D. 397 ± 152
Provenience: Feature #3, Locus I, Stripped area
Material: Unclassifiable corner-notched dart (Category 364)
Comments: Pit feature from the single component in this area of the site. Confirms date #1.

LOCUS II – WESTERN EXCAVATION BLOCK

23HI297-4
Date: A.D. 911 ± 103
Provenience: 221N 130W, 0 to 10 cm below plow zone
Material: Limestone
Comments: From Late Woodland component just below Mississippian assemblage from plow zone. Good date for Scallorn, Fresno, and Reed arrowpoints.

23HI297-19
Date: A.D. 950 ± 100
Provenience: 221N 130W, 10 to 20 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: A very consistent date.
Comments: From Late Woodland component, stratigraphically beneath sample #4. Those two dates compare favorably.

23HI297-20
Date: A.D. 600 ± 150
Provenience: 221N 130W, 20 to 30 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: Chert chosen for analysis was the more greyish of two pink samples. This should be a reliable date in terms of internal consistency.
Comments: Stratigraphically below samples #4 and #19. Dates lower portion of Late Woodland component.

23HI297-10
Date: A.D. 1317 ± 64
Provenience: Feature
Material: Chert
Comments: Sample is from pit feature which originated in the plow zone and intruded a Late Woodland component. Results would accurately date Mississippian period arrow forms (Fresno and Scallorn) found in plow zone.

23HI297-5
Date: A.D. 1 ± 168
Provenience: 221N, 115W, Feature #10, 10 to 30 cm below plow zone
Material: Limestone
Comments by Thermoluminescence Laboratory: This should be a very dependable date.
Comments: Sample is from rock feature in a test pit midway between the western and eastern excavation blocks on the upper terrace (T1-6) of HI297. No diagnostic artifacts in or near the feature to confirm the date, but it compares favorably with date #15 from the eastern block.

LOCUS II - EASTERN EXCAVATION BLOCK

23HI297-6
Date: 1598 ± 301 B.C.
Provenience: 219N 90W, 0 to 10 cm below plow zone
Material: Chert
Comments: From an assemblage containing Late Woodland point forms, this date is unreasonably early. May be from disturbed context or exposed to light.

23HI297-12
Date: A.D. 125 ± 500
Provenience: 221N 88W, 0 to 10 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: This chert behaved very well in two tests. In the first attempt we grossly underestimated the date, thinking it was about A.D. 500. The second attempt saw an underestimation of 28% of its apparent age as well. Since you are in a hurry for these dates, we provide an age estimation by interpolation to be as cited above. Certainly this piece does not come close to being as recent as A.D. 500, as even our first attempt gave an apparent age of A.D. 194 ± 155. This was the best of four samples picked, although there is the possibility that it was not heated to 400 degrees. Given the other dates obtained from this site, it seems reasonable to me, however.
Comments: This sample is the first of a series which, due to sampling inadequacies, is somewhat difficult to interpret. With a few exceptions, T.L. samples were chosen from general excavation levels in the lithics laboratory. Thus, the vertical control on these specimens is only to the closest 10 cm. The projectile point sequence which we are trying to date is, however, better controlled; most projectile points were piece plotted. The 10 cm level from which this particular T.L. sample came included only Late Woodland point forms, but those were largely from the upper portion of the level. Presumably earlier forms, such as Afton, were found beneath this Late Woodland component. Given the large margin of error on this date because it is an interpolation,

it is not very useful. If the true resultant date is nearer A.D. 500, it might date the Late Woodland component. If, on the other hand, it is truly A.D. 125, it compares favorably with dates #13, #15, and #16b, which probably date the Afton component.

23HI297-13
Date: A.D. 200 ± 175
Provenience: 221N 86W, 10 to 20 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: Lean to the young side on this date.
Comments: Due to the problems mentioned in comments from 23HI297-12, we cannot be absolutely certain; but it appears that this date represents the age of an Afton assemblage which is stratigraphically higher than another Late Archaic component. The Afton points are stratigraphically distinct from the Late Woodland material above them, and the Etley, Sedalia, Smith, and Table Rock Stemmed points below them. Acceptance of this date would place the Afton style in a later context than previously assumed. Such placement is, however, further supported by dates from 23BE337 – #1, #2, and #3.

23HI297-16a
Date: 640 ± 300 B.C.
Provenience: 221N 88W, 10 to 20 cm below plow zone
Material: Chert (grey)
Comments by Thermoluminescence Laboratory: The most burnt of 5 samples. Another seemingly less burnt sample is being run.
Comments: While this would ordinarily be an acceptable date for assemblages of this form (Afton points), it is inconsistent with other results from this component (i.e., HI297-12, -13, -16b). This chert was grey – noted by Rowlett (see comments, 23BE337-7) as less reliable than pink chert for T.L. determinations.

23HI297-16b
Date: A.D. 342 ± 130
Provenience: 221N 88W, 10 to 20 cm below plow zone
Material: Chert (pink)
Comments: Probably dates the Afton component at 23HI297. See comments from #13 and #16a.

23HI297-9
Date: 14,791±1425 B.C.
Provenience: 221N 92W, 10 to 20 cm below plow zone
Material: Truman Broad Blade (Category 328)
Comments by Thermoluminescence Laboratory: This age is considerably greater than expected. However, given its relatively great depth, the date seems not impossible. If contextual information implies that this is an impossibly old

date, then this piece must have been heated to somewhat less than 400° C., although it must have been heated to nearly that temperature.
Comments: Stratigraphically and stylistically (see dates #11 and #8 from same point type) this date is impossibly early.

23HI297-14
Date: 425 ± 250 B.C.
Provenience: 221N 86W, 20 to 30 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: See comment for HI297-15. If these two samples are from different strata, this one, 297-14 might be slightly older than its calculated age, as the induced radiation did not quite produce the glow of the original reading. If the two are from the same level, then one can conclude that this piece just barely attained 400° C. when being heated. Quote date as 2,400 years or 425 ± 250.
Comments: Both HI297-14 and -15 were from the same level of excavation. Due to sampling problems (see comments HI297-12), these results cannot be assessed with a high degree of certainty. It is not unreasonable to assume that this date represents the age of the component containing Sedalia, Etley, Smith, and Table Rock Stemmed points, or the lower portion of the excavation level.

23HI297-15
Date: A.D. 20 ± 200
Provenience: 221N 88W, 20 to 30 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: If this sample and HI297-14 are from exactly the same level and must be exactly the same age, then prefer this date to the determination of HI297-14 as it is internally more consistent.
Comments: This sample may date the Afton component or, less likely, the lower component with other Late Archaic point forms. See all previous comments.

23HI297-17
Date: A.D. 600 ± 110
Provenience: 223N 92W, 30 to 40 cm below plow zone
Material: Chert (pink)
Comments by Thermoluminescence Laboratory: This is a very reliable T.L. response. I think it most unlikely that this piece was heated as long ago as 1,000 B.C., the estimated age.
Comments: While stratigraphically lower than earlier dating samples, this piece was excavated from a level which contained the lower portion of a pit feature — possibly fill within a house floor which originated from the midden containing Woodland materials. This sample probably dates the Late Woodland assemblage from the site.

23HI297-8
Date: A.D. 236 ± 167
Provenience: 223N 92W, 33 cm below plow zone
Material: Truman Broad Blade (Category 328)
Comments: This specimen came from the same excavation unit as samples HI297-17 (described above) and HI297-11 (described next). Evidence from excavation and soil profiles indicate that this point was probably from the surface of a pit feature – perhaps a house floor. While this specimen is morphologically similar to that dated as HI297-11, the two points appear to have been in different contexts. This specimen may date the living surface of the house. It compares favorably with dates from samples HI297-16b and -13.

23HI297-11
Date: 949 ± 266 B.C.
Provenience: 223N 92W, 42 cm below plow zone
Material: Truman Broad Blade (Category 328)
Comments: This specimen, while morphologically similar to HI297-8, was recovered 10 cm below it and in a different context. This point was found in the midden below the pit feature described above. It may accurately date a Late Archaic assemblage which contained a Table Rock Stemmed point, a square stemmed form (Category 336) and a Cooper point (Category 311).

23HI297-7
Date: None
Comments by Thermoluminescence Laboratory: Neither of the two samples submitted appeared heat treated, and so the T.L. process was not begun.

23HI297-18
Date: 4000 ± 440 B.C.
Provenience: 221N 88W, 40 to 50 cm below plow zone
Material: Chert
Comments by Thermoluminescence Laboratory: This sample responded to the T.L. process very well. Although it came out considerably older than the estimated date, could this not be the true date, seeing how much deeper it was than the other material?
Comments: Due to the problems with the sampling procedures (discussed above in HI297-12), it is difficult to assess this date. The sample came from a level, the top of which dated 3,000 years earlier (HI297-11). This result may accurately date a Stone Square Stem (Category 337) specimen from the unit, albeit a fairly early date for this point form. It seems not unreasonable to assume that the site was occupied at such an early date; a bifurcated base point (Category 374) was found deep in the western excavation block of the site. While that component of the site has not been radiometrically dated, the form of that point suggests that the site may have been occupied as early as the Middle Archaic period.

23BE214 – The Pippens Site

23BE214-1
Date: None
Provenience: 00N 15W, 30 to 40 cm below surface
Material: Limestone
Comments by Thermoluminescence Laboratory: Sample was not heated sufficiently to 400° C. in antiquity. After being irradiated (the third time) at 10,000R, the Original T.L./ Induced T.L. ratio was still high (significantly over the ideal 1.000 ratio). From the T.L. glow curves it seems that this sample was only heated to 275° C.-300° C.

23BE214-2
Date: 811 ± 237 B.C.
Provenience: 30N 15W, 30 to 40 cm below surface
Material: Chert
Comments by Thermoluminescence Laboratory: Note from OTL/ ITL ratio that age is probably less than even 3,000 years. If this piece was originally produced about 8,000 B.C. (the estimated age), it must have been re-heated or exposed to intense insolation much later.
Comments: This sample was recovered from the lowest level in the site (immediately above unconsolidated bedrock) – a level which contained Dalton material. The date above confirms that the multicomponent site has been mixed, with the Woodland assemblage co-occurring with the early materials.

23SR189

23SR189-1
Date: None
Provenience: 20S 25E, 21 to 31 cm below surface
Material: Limestone
Comments by Thermoluminescence Laboratory: The ostensible age of this stone would be 17,000 years ago. Do not consider this a valid age estimation; it required four trials to even get close to this figure.

23SR189-2
Date: A.D. 20 ± 200
Provenience: 20S 25E, 31 to 41 cm below surface
Material: Chert
Comments: No diagnostic points were recovered from 23SR189 below the plow zone, making evaluation of T.L. dates difficult. Surface points are diagnostic of the Woodland and Late Archaic periods, with the exception of a small Big Sandy form (Category 374) from the plow zone in this square. The T.L. dates support a similar span of occupation.

23SR189-3
Date: 1100 ± 300 B.C.
Provenience: 20S 25E, 41 to 51 cm below surface
Material: Chert
Comments by Thermoluminescence Laboratory: Seems reliable; a straight-forward response.
Comments: See comments for SR189-2.

23SR189-4
Date: 2,000 ± 400 B.C.
Provenience: 20S 25E, 51 to 61 cm below surface
Material: Limestone
Comments by Thermoluminescence Laboratory: Seems reliable, although this is on a limestone sample. Generally, in the Truman Reservoir samples we had difficulties re-irradiating the limestone. No anomalies noted in this instance, however.
Comments: See comments for SR189-2.

23BE681

23BE681-1
Date: 16,129 ± 1900 B.C.
Provenience: 125S 30E, 30 to 40 cm below surface
Material: Chert
Comments by Thermoluminescence Laboratory: The original age estimation by your staff was A.D. 500 to the present. If this is not the true date, as it seems not to be, then the sample was not sufficiently heated to 340^{o} C. Comparison of the original and induced glow curves suggests that temperature, as the two glow curves meet at 340 degrees. The sample did behave consistently through several runs, as we began with artificial irradiations calculated to replicate an age of 1,500 years.
Comments: Date is impossibly early for site yielding projectile points diagnostic of Late Archaic, Woodland, and Mississippian occupations.

23BE681-2
Date: 2842 ± 397 B.C.
Provenience: 125S 30E, 30 to 40 cm below surface
Material: Limestone temper from ceramic sherd
Comments by Thermoluminescence Laboratory: This stony sample appeared to behave normally. Obviously the pottery was fired to a sufficiently high temperature. If this date seems inconsistent with other evidence, I would advise a cautious treatment since (1) we have had trouble with most of the BE681 samples, and (2) we have also gotten somewhat inconsistent results from other limestone tempers from the Truman Reservoir area. It is possible that the BE681 materials were subjected to some distortion-causing conditions while being processed (overheating, exposure to sunlight or U-V light, storage at the reactor).

Comments: This date seems unreasonably early for the introduction of pottery manufacture to the area.

23BE681-3
Date: 300 ± 225 B.C.
Provenience: 350S 80E, 30 to 40 cm below surface
Material: Chert
Comments by Thermoluminescence Laboratory: This sample manifested normal T.L. response. It seems like a secure age estimation, except for the association with other samples which gave highly unexpected dates or which behave anomalously.
Comments: This may date the earliest occupation at 23BE681, but spurious results from other T.L. samples from the site make such a conclusion tentative at best.

23BE681-4
Date: 1054 ± 285 B.C.
Provenience: 350S 80E, 0 to 30 cm below surface
Material: Limestone temper from ceramic sherd
Comments by Thermoluminescence Laboratory: This piece of limestone saturated extremely quickly; no matter what dosage we gave it, the piece of temper could only read about .2 nano-Coulombes. Since it was the only piece of temper in this sherd, it was impossible to start a new sample. Ostensibly, by the logic of the T.L. test, it "ought to be older than 3,000 years," but in view of the low saturation level of this temper, it is probably younger than that date. I recommend considering 3,000 years a maximum date estimation. We also calculated a date on the basis of the glow in the 350-370° C. range. It gave a very similar age of determination of 1.079±1, 200 B.C. None of these age determinations seem very reliable to me, although there is an implication that the pottery is older than A.D. 1,000. This information is transmitted for whatever perspective it can provide.
Comments: Comments above suggest that this sherd dates from the Woodland occupation of the site rather than the later Mississippian period.

23SR675

23SR675-1
Date: 2222 ± 391 B.C.
Provenience: Test Pit #3, 176 to 186 cm below surface
Material: Chert
Comments by Thermoluminescence Laboratory: The main problem with this sample is the background radiation. Only a charcoal sample was available for use to measure background. This gave an annual rate of .378 rads, which looks quite reasonable, so the date was calculated on that basis. Site 23SR189, from the same county but far away, had a mean background reading of .569R (rather high). A date calculated on this basis would be 800 B.C. with the same percentage of error, ca. 10%.

Comments: Given the difference between SR189 and SR675 in stratigraphic situation of dosimeter placement for background radiation monitoring, the date of 2222 B.C. (calculated on the basis of SR675's reading) seems more reasonable. Three projectile points were recovered from this excavation unit/level, all of the same type (Category 355), but are totally unknown in terms of temporal placement. The calculated date appears reasonable in respect to depth of the occupation; it is not unlikely to have Late Archaic components buried by sediments 2 meters or more in depth.

23SR675-2
Date: 20,005 ± 2,308 B.C.
Provenience: Test Pit #3, 176 to 186 cm below surface
Material: Limestone
Comments by Thermoluminescence Laboratory: There was the same background radiation problem as with SR675-1. Additionally, this piece has somehow been exposed to ultraviolet light, fallout, or other source of radiation, to raise its response so that it will take about 7,500 rads to match its original glow. This seems to me obviously not the true date of this limestone.
Comments: From same living surface as SR675-1. This date is unreasonable.

Burial Tumuli

Two series of samples from various burial mounds and cairns were submitted for dating determination by thermoluminescence. The first set was completed early enough to be incorporated with mortuary analyses presented in Volume III. Those dates, as well as some of the methods used in processing those samples, are described in some detail in Appendix E of that volume. In the interest of ease in referring to dates from the tumuli, that original set of dates is included in the listing below.

ORIGINAL SERIES

23PO306-4
Date: A.D. 1317 ± 30
Material: Cupp point

23PO306-41
Date: A.D. 1590 ± 30
Material: Reed Arrowpoint
Comments: The discrepancy of these two dates is difficult to explain in terms of archeological context. Both were from the same mound where there is no evidence of episodic burial. The later date is somewhat out of line with the artifact assemblage, but could be acceptable. The discrepancy may be due to errors created as a result of curation

practices; a period of more than ten years elapsed between excavation and T.L. processing. An average of the two dates – A.D. 1453 ± 30 – will be used.

23DA225-49
Date: A.D. 963 ± 49
Material: Chert flake
Comments: Fitting with cultural inventory which includes Mississippian artifacts.

23PO307-55
Date: A.D. 1158 ± 40
Material: Chert flake
Comments: Fitting with cultural inventory which includes Mississippian artifacts.

23HI135-18
Date: 900 ± 427 B.C.
Material: Afton point
Comments: Date agrees with typical assignments of Afton points to the Late Archaic period. Two other dates (C-14) run on bone from the single burial in this mound conflict with this date. Samples GX-558 and GX-569 yielded 520 BP ± 135 and 385 BP ± 105, respectively (Wood 1976: 311). Yet another date from the mound was obtained from the second series of T.L. samples. That specimen (HI135-1), a tooth from the burial, confirmed the Late Archaic date obtained on the Afton point – 1045 B.C. ± 201.

SECOND SERIES

23HI135-1
Date: 1045 ± 201 B.C. (second run 2817 ± 320 B.C.)
Material: Dentin from adult tooth
Comments by Thermoluminescence Laboratory: The first run of this tooth gave a date of 1,045 ± 201 B.C. For experimental purposes we did a second run on the dentin after the dentin had been exposed to some daylight, although we tried to trim away exposed portions of the dentin. We thought you should see the results of the second run, although in both theory and practice it should be less reliable than the first run. The better of the two TL dates (in terms of procedure) agrees well with a TL date on stone, but in sharp contrast with radiocarbon dates. Are the bones from the same skeleton which produced the teeth? In any case, since the two different media, dentin and flint, give TL results in the same direction, my recommendation is to follow the TL age determinations.
Comments: See comments for HI135-18 above.

23BE3-38
Date: A.D. 965 ± 80

Material: Rice Side-Notched point - Jefferson City chert
Comments by Thermoluminescence Laboratory: This is a mean of two freshly cut and run samples. This particular chert did not take subsequent irradiations well, so that second and third runs on the same samples tended to give younger dates down to ca. A.D. 1600. While date seems to agree with estimation, I would regard this result with more caution than normal on TL chert determinations.
Comments: Date may be acceptable, but given the presence of Hopewellian goods in the mound, a date of about A.D. 700 was expected. This date is far more acceptable than the date of A.D. 15 ± 215 obtained by averaging two C-14 dates (GX-559 and GX-570 [Wood 1976: 311]).

23CE122-51
Date: A.D. 1400 ± 50
Material: Table Rock Stemmed point - Burlington chert
Comments by Thermoluminescence Laboratory: Given the nature of TL dating processes and the fact that it did not take much irradiation (200 rads) to exceed the original signal, it seems unlikely that the piece comes out as being heated much before A.D. 1400. This was a date calculated with very little control over background irradiation so we had to take a mean of irradiations. The highest rate would have produced an A.D. 1575- date and lowest would have produced a 1350- date.
Comments: It was postulated that this mound was built early in the Late Woodland period, perhaps around A.D. 700. While the assemblage did not include artifacts diagnostic of a later period, this date may be reasonable. The date from a tooth from the mound, CE122-1 below, supports this date.

23CE122-1
Date: A.D. 1350 ± 50
Material: Dentin from adult tooth
Comments: See comments for CE122-51 above.

23BE6 Mound 2 — 102I
Date: A.D. 1250 ± 50
Material: Scallorn arrowpoint - Jefferson City chert
Comments by Thermoluminescence Laboratory: An internally consistent date.
Comments: This date may be too old for a mound which contained white trade goods. It is unclear, however, whether those goods were included in the mound during its construction. This date is certainly more in line with the mound's contents than sample BE6-2-103D below.

23BE6 Mound 2 — 103D
Date: 1060 ± 50
Material: Rice Side-Notched Variant - Jefferson City chert
Comments by Thermoluminescence Laboratory: This date is

internally not as close as the date from BE6-M2-2I. The latter date presumably would be from a piece more perfectly heated if the two pieces of flint are supposed to be from the same time. If they are from the same phase or horizon, lean toward the date of BE6-M2-2I, even though the margins of error of the two pieces do overlap.
Comments: The cultural assemblage at the mound supports the later date of A.D. 1250. It is not impossible that the mound represents two or more episodes of burial during different periods, one of which was around A.D. 1060. A date from another mound in the group of four mounds (BE6-1-107B below) would certainly lend support to that possibility.

23BE6 Mound 1 – 107B
Date: A.D. 1060 ± 50
Material: Cooper corner-notched point - Jefferson City chert
Comments: The assemblage at the mound nicely supports this date – basically Woodland period materials but with a few Mississippian period artifacts.

23CE123-100
Date: A.D. 1150 ± 60
Material: Fresno arrowpoint – Chouteau chert
Comments by Thermoluminescence Laboratory: Must be slightly older than amount represented by induced irradiation.
Comments: Date is well supported by the assemblage at the cairn which included many multiple-notched triangular arrowpoints.

23BE136-15
Date: A.D. 1100 ± 50
Material: Rice Side-Notched point – Exotic chert
Comments: From a mound with exclusively Woodland period artifacts, including two Middle Woodland Snyders points. While the date seems too late, it is not impossibly so given apparent cultural continuity in the area.

23BE128-14
Date: A.D. 1450 ± 50
Material: Chert (pot lid)
Comments: This mound contained white trade goods which were almost undoubtedly buried at the time of mound construction. This evidence makes the TL date approximately 200 years early.

23BE148-50
Date: None
Material: Rice Side-Notched point – Jefferson City chert
Comments by Thermoluminescence Laboratory: This sample was irradiated at several doses ranging from 425 R to 75 R (several new samples cut and processed along the way), and yet the glow responses remained inconsistent throughout 8 attempts. Although a TL date cannot be calculated, the glow curves do show that this sample has been heated.

Original Series Dates for 23BE259

A series of samples was collected in 1977 at 23BE259 for thermoluminescence dating. They were dated that winter in the Thermoluminescence Laboratory at the University of Missouri, by Margaret D. Mandeville. The results of those determinations are presented here.

23BE259-1
Date: 2223 ± 111 B.P.
Material:

23BE259-2
Date: 2335 ± 327 B.P.
Material:

23BE259-3
Date: 2232 ± 216 B.P.
Material:

Comments: These dates are remarkably consistent with one another, but on the whole seem to be young for the materials they date. All three samples are from an intensely burned feature, associated with a small but dense scatter of debris. A single projectile point was also associated with the feature. The point base is broken but appears to be a Jakie Stemmed (Category 371) point. Two Etley (Category 339) points and a Smith point (Category 326) were found to the south, but the association is tenuous. While all these types are well known in Missouri, none are securely dated. The dates are difficult to interpret at present and are neither summarily rejected nor wholeheartedly accepted.

ARCHEOMAGNETIC DATING

The smallest set of dates was determined by archeomagnetism. This process is most reliably applied to clays that have been fired and remain absolutely in the position in which they were fired. While it is thus applicable in a small set of situations, it is, when applicable, possible to obtain dates that are accurate to within 30 years (Eighmy 1980: 15). Like radiocarbon dating, archeomagnetic dating relies on associations between burned features and actual tool specimens. Unlike radiocarbon dating, however, archeomagnetic dating dates the actual firing without further depending on control of such factors as which rings of the burned wood the sample is from, whether there has been contamination by recent organic matter or the like. On the negative side is the problem that the polar curve has not yet been extended very far back in time (cf. Wolfman 1980; Eighmy 1980). In its absence, however, the magnetic alignment of a sample can still be measured and precisely dated when the polar curve is established.

The intensely burned feature at 23BE260 (mistakenly referred to as 23BE259B in the field) provided an ideal set of circumstances for archeomagnetic dating. A single sample, consisting of 8 cubes of bits of earth encased in plaster, was taken and submitted to Dr. Daniel Wolfman of the Arkansas Archeological Survey, Russellville, Arkansas. His report of his measurements of the sample is contained in his letter of October 21, 1980. This letter is reproduced as follows.

RADIOCARBON DATING

Radiocarbon dating has, of course, long been the mainstay for absolute dating of archeological materials less than 40,000 years old. It is an unfortunate fact, however, that radiocarbon datable organic material is in extremely short supply in sites in the Truman Reservoir. It is probably this problem more than any other that has hindered the development of a good chronology for the Osage River basin and, indeed, for the Ozarks in general.

The scope of work for the present project called for collection of "sufficient materials for an average of three dates per excavated site," these dates to be obtained by radiocarbon, thermoluminescence or archeomagnetism. Radiocarbon dating is the preferred technique and emphasis was, therefore, placed on collecting any and all possible datable samples. When the time came to submit samples for dating,

however, the contract amendment for dating (Modification No. P00002) specified only 10 radiocarbon dates, in recognition of the small number of available samples. After the contract modification had been made and samples were actually prepared for submission, it was possible to submit only nine samples from 4 sites and some of these proved too small for reliable dating. All samples were submitted to Dicarb Radioisotope Company. The results are summarized in Table 2 and below for individual samples. All dates are uncorrected.

23BE337 – The Terre Baby Site

DIC-1913
Date: 890 B.P. ± 125 – A.D. 1060±125
Provenience: 67S 83E 10 to 30 cm below plow zone
Laboratory comments: Small (2.5 gm), but large enough to give reliable date.

DIC-1914
Date: 940 B.P. ± 185 – A.D. 1010 ± 185
Provenience: 61S 83E 20 to 30 cm below plow zone
Laboratory comments: Very small, but quite clean after wet pick.

DIC-1915
Date: 110 B.P. ± 225 – A.D. 1840 ± 225
Provenience: 67S 83E 30 to 40 cm below plow zone
Laboratory comment: Very tiny sample; a few roots found during wet pick.
Comments: The laboratory urged caution in the use of DIC-1915 due to the small size (< .5 gm) of the sample and the possible contamination by modern rootlets. In fact, the date is much too late for the associated material and is rejected. The other two dates are consistent with one another. A t-test of contemporaneity of the dates (cf Long and Rippeteau 1974: 210-211) yields a value of 0.22 with an associated probability of .91 that the two samples are contemporaneous. Their average is A.D. 1044±104. This should date the Late Woodland forms. DIC-1914 is from the same excavation level as TL sample 23BE337-3 which yielded a date of A.D. 620±110; DIC-1913 is from the unit adjacent to that from which TL sample 23BE337-4 yielded a date of A.D. 634±109. Each set of dates is internally consistent, but the results of dating by the two techniques are inconsistent.

23HI297 – The Cross Timbers Site

DIC-1917
Date: 2310 B.P. ± 100 – 360 B.C. ± 100
Provenience: Locus I, Feature 2, 14.8 cm below
Laboratory comment: Smallish sample; a few small roots present.

TABLE 2

Summary of Radiocarbon Dates

Site Number	Provenience	Material	Laboratory Number	Size of Sample (gm)	Date B.P.	Date A.D./B.C.
23BE337	67S 83E 10-30 BPZ	wood charcoal	DIC-1913	.5976	890±125	A.D. 1060±125
23BE337	61S 83E 20-30 BPZ	nut hulls	DIC-1914	.3773	940±185	A.D. 1010±185
23BE337	67S 83E 30-40 BPZ	wood charcoal	DIC-1915	.2553	110±225	A.D. 1840±225
23HI297	Locus I, Fea. 2	wood charcoal	DIC-1917	1.1993	2310±100	360 B.C.±100
23HI297	Locus I, Fea. 4	hickory nut shell	DIC-1918	2.4388	2730±60	780 B.C.±60
23HI297	Locus II	wood charcoal	DIC-1919	Insufficient carbon for analysis		
23HI297	Locus II	wood charcoal	DIC-1920	2.0100	Modern	-
23SR675	T.P. 4, Fea. 1	wood charcoal	DIC-1912	.1027	3640±790-870*	1960 B.C.*
23BE260	Feature 1	wood charcoal	DIC-1916	Insufficient carbon for analysis		

*Indicator date only

DIC-1918
Date: 2730 B.P. ± 60 — 780 B.C. ± 60
Provenience: Feature 4
Laboratory comments: Good sample, almost all nice clean hickory nut shell.

DIC-1919
Date: Insufficient carbon for analysis
Provenience: Locus II

DIC-1920
Date: Modern
Provenience: Locus II, 219N 90W, 0 to 10 cm below plow zone
Comments: The inability to date two of the four samples from this site was disappointing. The two Locus I feature dates are not contemporaneous ($t=3.22$, $p < .001$) possibly because of the presence of some small roots in the small sample DIC-1917. For this reason, the 2730 B.P.±60 (780 B.C.±60; DIC-1918) may be the more reliable date. Further discussion may be found in the excavation report for the site.

23SR675

DIC-1912
Date: 3640 B.P. ± 790 — 870 - 1690 B.C.
Provenience: Test Pit 4, Feature 1
Laboratory comments: Sample too small to give reliable date; is an indicator date only.
Comments: Bearing in mind that the date is an indicator date only, it appears a reasonable estimate. The date should pertain to an occupation buried beneath approximately 2 meters of alluvium and characterized by projectile points of Category 355. A Late Archaic period date is not unlikely for this occupation.

23BE260 — The Avery Bridge Site

DIC-1916
Date: Sample too small
Provenience: Feature 1
Laboratory comment: Clean sample but judged too small to yield a reliable date.
Comment: This is the same feature from which the archeomagnetism sample was obtained and which was TL dated by samples 23BE259-1, 23BE259-2, 23BE259-3.

REFERENCES CITED

Eighmy, Jeffrey L.
1980 Archeomagnetism: a handbook for the archeologist. Cultural Resource Management Services, U. S. Department of the Interior, Heritage Conservation and Recreation Service.

Long, Austin and Bruce Rippeteau
1974 Testing contemporaneity and averaging radiocarbon dates. American Antiquity 39(2): 205-215.

Wolfman, Daniel
1980 Archeomagnetic dating in Arkansas and the border areas of adjacent states. Paper presented at the 45th Annual Meeting of the Society for American Archaeology, Philadelphia, Pennsylvania.

Route 1, Box 579
Russellville, Arkansas 72801
October 21, 1980

Dr. Donna Roper
15 Switzler Hall
University of Missouri
Columbia, Missouri 65201

Dear Dr. Roper:

At long last I have the results from the archeomagnetic sample collected by Marnie Mandeville on August 15 and 17, 1977 at the Avery Bridge Site (23BE259B) in Missouri. Recent discussions of the archeomagnetic dating method can be found in an article by Eighmy et al. in the latest American Antiquity (Vol. 45, No. 3, pp. 507-517) and the manuscript "Archeomagnetic Dating in Arkansas and the Border Areas of Adjacent States" to be published by the Arkansas Archeological Survey in the near future. A copy of this manuscript is enclosed.

I measured the sample on the cryogenic magnetometer at the University of Pittsburgh rock magnetism laboratory. The alternating field demagnetization studies indicated that 150 oe. was the best level for magnetic cleaning and a pole position of latitude N. 72.4°, longitude W. 155.9° was obtained. The alpha-95 value for this sample is 2.3° which indicates very good agreement between the specimen directions. Consequently, the pole position obtained will be useable for dating purposes when the polar curve for the Early/Middle Archaic in the Midwest is constructed. Although this has not yet been accomplished, this past summer I collected twenty Early and Middle Archaic samples at Modoc Rock Shelter in Illinois and hope to collect more there next summer. Many C-14 samples from this excavation are being processed. Hopefully, this work will provide a well calibrated polar curve for the Early and Middle Archaic in the Midwest and allow us to date the sample collected at the Avery Bridge Site.

I quoted a figure of $150 for processing the sample and a formal statement is enclosed.

Sincerely,

Daniel Wolfman

Daniel Wolfman

DW/ggw
Encl:
cc: Margaret Mandeville